

2005

## 2005 Calendar Year Report to the Rio Grande Compact Commission

Hal D. Simpson  
*Colorado*

John R. D'Antonio  
*New Mexico*

Patrick R. Gordon  
*Texas*

Bill Ruth  
*Federal Chairman*

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# RECLAMATION

*Managing Water in the West*

## 2005 Calendar Year Report to the Rio Grande Compact Commission

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Hal D. Simpson

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U. S. Department of the Interior  
Bureau of Reclamation  
Albuquerque Area Office  
Technical Services Division  
Albuquerque, New Mexico

March 2006

## MISSION STATEMENTS

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cover photo - Aerial view of the San Marcial Railroad Bridge where it crosses the Rio Grande during 2005 Spring Runoff. Note the breach of the interior berm at the top of the photo. Also notice the train on the bridge at the time of the photo.

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*Managing Water in the West*

## **2005 Calendar Year Report to the Rio Grande Compact Commission**



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# Table of Contents

<b>Table of Contents .....</b>	<b>i</b>
<b>List of Figures.....</b>	<b>iii</b>
<b>List of Tables .....</b>	<b>iii</b>
<b>List of Photos.....</b>	<b>iv</b>
<b>Introduction.....</b>	<b>1</b>
<b>San Luis Valley Project, Colorado .....</b>	<b>3</b>
Conejos Division, Platoro Reservoir .....	3
Platoro Dam Facility Review and Safety of Dams Programs.....	3
Closed Basin Division.....	3
Closed Basin – Operations and Maintenance .....	4
Operations.....	4
Maintenance.....	6
Water Quality.....	7
Rio Grande Water Conservation District.....	7
<b>San Juan-Chama Project, Colorado – New Mexico .....</b>	<b>9</b>
San Juan-Chama Diversion Dams .....	9
Heron Dam and Reservoir Operations.....	9
Pojoaque Tributary Unit - Nambé Falls Dam and Reservoir.....	12
Nambé Falls Dam Facility Review and Safety of Dams Programs .....	14
M&I Water Use - National Environmental Policy Act Compliance .....	14
<b>Middle Rio Grande Project, New Mexico.....</b>	<b>17</b>
New Mexico Relinquishment of Rio Grande Compact Credit.....	17
El Vado Dam and Reservoir Operations.....	18
El Vado Dam Facility Review and Safety of Dams Programs .....	19
U.S. Army Corps of Engineers' Related Reservoir Operations.....	20
Cooperative Programs with the State of New Mexico.....	21
Water Salvage work for the Middle Rio Grande Project.....	21
Elephant Butte and Caballo Reservoir Vegetation Management Cooperative Agreement ..	21
Temporary Channel into Elephant Butte 2000 .....	21
Elephant Butte Temporary Channel 2002.....	23
Elephant Butte Temporary Channel 2004.....	24
River Maintenance .....	25
River Maintenance Priority Sites.....	25
La Canova .....	25
Salazar Pit .....	26
San Ildefonso Pond .....	27
Santa Fe River Confluence .....	29

Cochiti Priority Sites.....	29
Santa Ana.....	31
Bernalillo Area Priority Sites.....	33
San Acacia to Escondida Reach Priority Sites.....	35
Arroyo de la Parida.....	38
Tiffany Sediment Plug Removal.....	39
Truth or Consequences.....	39
2005 Spring Runoff Critical Repairs.....	40
2005 Post-Runoff Field Review.....	45
Middle Rio Grande River Maintenance Plan.....	47
Rio Grande River Restoration Projects.....	48
I-40 Rio Grande Silvery Minnow Habitat Restoration Project.....	48
Los Lunas Habitat Restoration Project.....	48
Rio Grande and Low Flow Conveyance Channel (LFCC) Modifications and EIS.....	48
Endangered Species.....	49
Rio Grande Silvery Minnow.....	49
Southwestern Willow Flycatcher.....	51
Middle Rio Grande Endangered Species Act Collaborative Program.....	53
Programmatic Water Operations and River Maintenance ESA, Section 7, Consultation.....	54
Rio Grande Silvery Minnow v. Keys Litigation.....	54
Temporary Pumping Program – San Acacia to Fort Craig Reach.....	55
<b>RIO GRANDE PROJECT (NEW MEXICO - TEXAS) .....</b>	<b>57</b>
Water Supply Conditions.....	57
Project Irrigation and Drainage Systems and Title Transfer.....	60
Elephant Butte Reservoir and Powerplant.....	60
Elephant Butte Dam Facility Review and Safety of Dams Programs.....	61
Caballo Dam and Reservoir.....	61
Caballo Dam Facility Review and Safety of Dams Programs.....	62
Data Automation and Instrumentation and Flow Monitoring System.....	62
Elephant Butte and Caballo Reservoirs Resource Management Plan.....	63
Diversion Dam Facility Review and Safety of Dams Programs.....	63
Rio Grande Project Adjudications.....	63
Elephant Butte and Caballo Reservoir Vegetation Management Cooperative Agreement.....	64
<b>EL PASO FIELD DIVISION PLANNING STUDIES AND INTERACTION WITH THE NEW MEXICO - TEXAS WATER COMMISSION .....</b>	<b>65</b>
Elephant Butte and Caballo Reservoir Water Quality Assessments.....	65
Rio Grande/Rio Bravo International Basin Assessment / Border Regional Environmental Workgroup.....	65
Current Activities.....	67
Environmental Health in the US-Mexico Border Region.....	67
International Boundary & Water Commission planning for Rio Grande Summit per Minute 308.....	67
Reports.....	68
Databases.....	68

Caballo Mercury Study .....	69
Snow-Melt Runoff Modeling.....	69
<b>OTHER RECLAMATION PROGRAMS.....</b>	<b>71</b>
Department of the Interior’s Water 2025 Initiative .....	71
Reclamation’s Water Conservation Field Service Program.....	72
Title XVI Water Reclamation and Reuse Projects .....	72
Upper Rio Grande Water Operations Model .....	74
Hydrologic DataBase (HDB).....	75
Evapotranspiration (ET) Toolbox Decision Support System .....	76
Upper Rio Grande Basin Water Operations Review .....	77
Native American Affairs Programs .....	79
Emergency Drought Program .....	79

## List of Figures

Figure 1: Project Map of Reclamation's Albuquerque Area Office.....	2
Figure 2: Area Map of San Luis Valley Project .....	4
Figure 3: Area Map of the San Juan-Chama Project .....	10
Figure 4: Area Map of the Middle Rio Grande Project .....	18
Figure 5: October 2005 Surveyed Populations .....	50
Figure 6: Observed Eggs during Salvage.....	50
Figure 7: Albuquerque Hydrograph Comparison .....	50
Figure 8: Rio Grande Silvery Minnow Abundance .....	51
Figure 9: Area Map of the Rio Grande Project.....	58
Figure 10: Area Map of the Rio Grande/Rio Bravo International Basin Assessment .....	66

## List of Tables

Table 1: San Luis Valley Project - Closed Basin Division Water Accounting .....	5
Table 2: SJ-C Project - Diversions through Azotea Tunnel .....	10
Table 3: SJ-C Project - Water Deliveries from Heron Reservoir .....	11
Table 4: SJ-C Project - Monthly Water Storage in Heron Reservoir .....	11
Table 5: SJ-C Project - San Juan-Chama Water at Otowi .....	13
Table 6: SJ-C Project - Monthly Water Storage in Nambé Falls Reservoir .....	13
Table 7: Reservoir Operation for El Vado Dam .....	19
Table 8: Reservoir Operation for Abiquiu Dam .....	20
Table 9: Estimate of Southwestern Willow Flycatcher Territories – Middle Rio Grande Project, 2000 - 2005 Breeding Seasons.....	52
Table 10: Summary of 2005 Rio Grande Coordinated Spring Runoff Forecasts .....	59
Table 11: 2006 Rio Grande Coordinated Spring Runoff Forecasts.....	59



# List of Photos

Photo 1: Photograph showing the Rio Grande's inability to maintain a channel through the delta (1998).....	22
Photo 2: Looking south at washout around EB-26 on the Temporary Channel access road (2005).....	22
Photo 3: Temporary Channel 2000 groundwater pond (2005).....	23
Photo 4: Excavated channel and berm downstream of the Narrows, October 2005.....	24
Photo 5: Looking upstream at the La Canova site during high flows, the acequia is at the far left corner the photograph (May 2005).....	25
Photo 6: Looking upstream at the La Canova site after runoff (July 2005).....	26
Photo 7: Gabion weir structure at the Salazar Pit, equipment is placing apron material on upstream side of weir (July 2005).....	27
Photo 8: Bank erosion upstream of the San Ildefonso Pond, July 2005.....	28
Photo 9: Santa Fe Confluence priority site before reseeding, July 2005.....	29
Photo 10: West bankline of the Rio Grande at River Mile 231.3 on the Pueblo of Cochiti, July 2005.....	30
Photo 11: Eroding bankline at River Mile 228.9 on the Pueblo of Cochiti, July 2005.....	31
Photo 12: Erosion of excess sediment at Santa Ana, June 2005.....	32
Photo 13: Bernalillo and Sandia priority sites.....	34
Photo 14: Photo taken 06-10-05, looking south at San Lorenzo Arroyo Settling Basin. Photo shows the area cleared of vegetation for excavation of the realigned Low Flow Conveyance Channel.....	35
Photo 15: Photo taken on 05-16-05 at Station 1878+00. Shown are scrapers excavating for the new Low Flow Conveyance Channel. Photo taken by Rudy Bernal, Bureau of Reclamation.....	36
Photo 16: Photo taken 05-23-05, looking south (downstream) of station 1888+00. Photo shows a Cat 631 Scraper excavating material from the invert of new Low Flow Conveyance Channel. Groundwater is seeping into conveyance channel. Photo taken by Rudy Bernal, Bureau of Reclamation.....	36
Photo 17: Photo taken on 08-24-05, showing new Low Flow Conveyance Channel section at Station 1895+00 looking downstream. Photo shows completed riprap slope protection on the west side of new conveyance channel. Also shown is a Linkbelt 4300 Excavator performing final slope excavation on the east side of the conveyance channel. Photo taken by Rudy Bernal, Bureau of Reclamation.....	37
Photo 18: Photo taken 12-30-05, showing Contractor placing concrete grade control structure for San Lorenzo Arroyo. Four rows of sheet piles at 6-foot drops are shown. Photo taken by Cord Everetts.....	37
Photo 19: Looking downstream at RM 111 Priority Site. Symbol identifies proximity of existing levee and LFCC. (2005).....	38
Photo 20: Pilot channel excavation at the Tiffany Sediment Plug, November 2005.....	39
Photo 21: Removal of sediment at the Arroyo Hondo confluence near Truth or Consequences, December 2005.....	40
Photo 22: Drain Unit 7 immediately upstream of San Acacia Diversion Dam, arrow identifies location requiring riprap protection during spring runoff high flows (2005).....	41

Photo 23: Tiffany Levee looking downstream at top of levee during spring runoff high flows with sediment plug in the river channel. Note that levee has no freeboard and is close to overtopping. (2005)..... 42

Photo 24: Tiffany Levee showing completed placement of embankment material on the riverside of the Tiffany Levee (2005)..... 42

Photo 25: San Marcial Railroad Bridge crossing during spring runoff looking downstream. Arrow denotes breaches that occurred along the interior berm. (2005) ..... 43

Photo 26: San Marcial Levee looking upstream near EB 12 showing accumulated seepage through the levee, LFCC on left and river behind levee on right (2005)..... 44

Photo 27: San Marcial Levee near Ft. Craig showing void created by piping through the levee (2005)..... 44

Photo 28: San Marcial Levee near Ft. Craig showing completed repair work (2005) ..... 45

Photo 29: Post Runoff review at the Corrales Siphon location looking upstream on west bank showing bank erosion underneath large cottonwood tree (July 2005) ..... 46

Photo 30: Post Runoff review at the Ft. Craig pump site location looking at west bank showing bank erosion and increased bank height from channel degradation (July 2005)..... 47



# Introduction

The Albuquerque Area Office of the Bureau of Reclamation is responsible for operation, maintenance, and oversight of four projects on the mainstem of the Rio Grande and its upper basin tributaries. These projects are: the *San Luis Valley Project*, the *San Juan-Chama Project*, the *Middle Rio Grande Project*, and the *Rio Grande Project* (Figure 1).

The *San Luis Valley Project* consists of the Conejos and Closed Basin Divisions. The Conejos Division, which includes Platoro Dam and Reservoir, provides water for approximately 86,000 acres within the Conejos Water Conservancy District. The Closed Basin Division is a ground water salvage project located near Alamosa, Colorado which pumps water from a shallow unconfined aquifer.

The *San Juan-Chama (SJ-C) Project* consists of a system of storage dams, diversion structures, tunnels and channels for transbasin movement of water from the San Juan River Basin to the Rio Grande Basin, as a component of the Colorado River Storage Project. The SJ-C Project provides water for municipal, domestic, industrial, recreation, fish and wildlife purposes, and supplemental water for irrigation. Another component of the project is the Pojoaque Irrigation Unit and Nambé Falls Dam. The Pojoaque Irrigation Unit provides water for approximately 2,800 acres in the Pojoaque Valley.

The *Middle Rio Grande Project* consists of El Vado Dam and Reservoir and irrigation and drainage facilities in the middle Rio Grande valley. The project also entails river channel maintenance from Velarde, New Mexico, southward to Caballo Reservoir, and the Low Flow Conveyance Channel (LFCC) south of San Acacia, New Mexico. Irrigation water is provided to MRGCD which supplies water to 50,000 to 70,000 acres of land.

The *Rio Grande Project* includes Elephant Butte and Caballo Reservoirs and Percha, Leasburg, Mesilla, and Riverside Diversion Dams. The Project resides in the lower Rio Grande valley of southern New Mexico to just south of El Paso, Texas. The *Rio Grande Project* provides an agricultural water supply for approximately 178,000 acres of land within the Elephant Butte Irrigation District in New Mexico and the El Paso County Water Improvement District No. 1 in Texas. Water is also provided for diversion to Mexico by the International Boundary and Water Commission-United States Section according to the terms of the 1906 Treaty between the United States and Mexico. Drainage waters from the Rio Grande Project lands provide a supplemental supply for approximately 18,000 acres of land within the Hudspeth County Conservation and Reclamation District No. 1 in Texas. Elephant Butte Dam also provides generation of electrical power for communities and industries in southern New Mexico. Reclamation transferred title to the canal and drainage facilities to the districts in 1996.

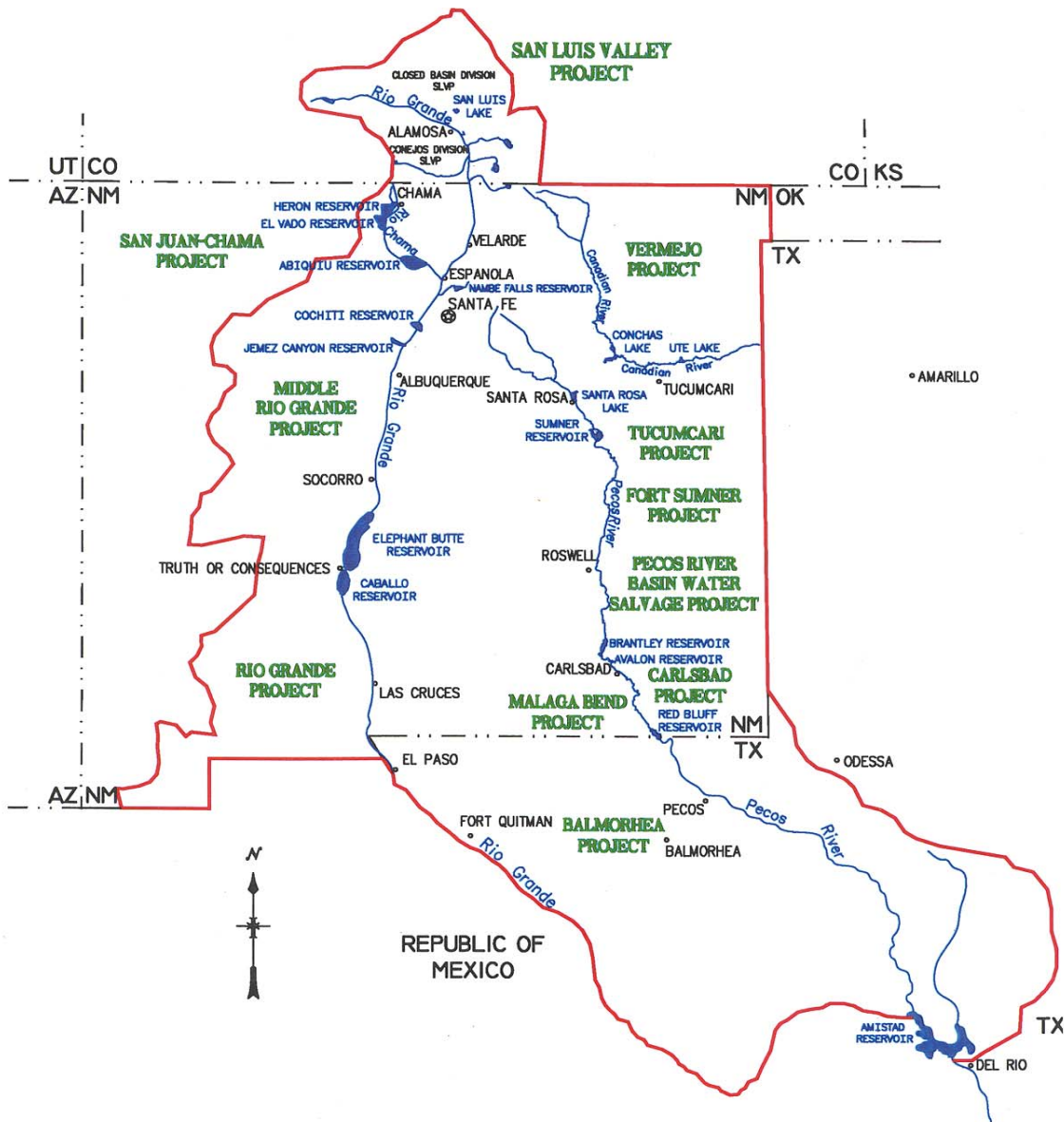


Figure 1: Project Map of Reclamation's Albuquerque Area Office

# San Luis Valley Project, Colorado

## Conejos Division, Platoro Reservoir

The Conejos Water Conservancy District operates the Conejos portion (Platoro Dam and Reservoir) of the San Luis Valley Project. The Conejos Water Conservancy District office is in Manassa, Colorado.

Platoro Reservoir began the 2005-year with a content of 9,158 acre-feet (af) at elevation of 9,960.94. All water stored for compact and some stored when allowed under article VII for district use was released by November 17 for compact purposes. The reservoir was used to re-regulate direct-flow water of 15,165 acre-feet, which was subsequently released to the rightful ditch owners before October 31. There has been some discussion with Bureau personnel about the proposed partial penstock-painting project.

## Platoro Dam Facility Review and Safety of Dams Programs

In 2005 Platoro Dam had the following activities completed:

- Security assessment was completed
- The Conejos Water District, in collaboration with the Albuquerque Area Office and the Denver TSC Office has developed a plan for addressing O&M recommendation 1998-2-B 2001-2-C (recoating of the butterfly valves and 40 feet of downstream outlet-works). The water district plans on splitting the O&M into two separate phases.
  - Phase I – will focus on re-coating only
  - Phase II – will focus on replacing the butterfly valves a letter outline how, when, where, will soon follow
- Manometer needs to be re-evaluated for replacement

## Closed Basin Division

The Alamosa Field Division of the Albuquerque Area Office operates and oversees the maintenance of a water salvage project constructed in the Closed Basin area of the San Luis Valley, Colorado. The purpose of the project is to salvage unconfined ground water from the Closed Basin that would otherwise be lost to evaporation and evapotranspiration. The salvaged water is pumped from 170 salvage wells and delivered through a conveyance channel to the Rio Grande to assist Colorado in meeting its commitment under the Rio Grande Compact. The project also provides for the delivery of mitigation water to the Alamosa National Wildlife Refuge and Blanca Wildlife Habitat Area, and stabilization of San Luis Lake. Reclamation continues to work under the guidance of the Closed Basin Division Operating Committee in management of Closed Basin operations and water deliveries. The 2005 Review of Operations and Maintenance Examination (RO&M) was conducted on October 25, 2005 and the Final report is scheduled for delivery in late February 2006.

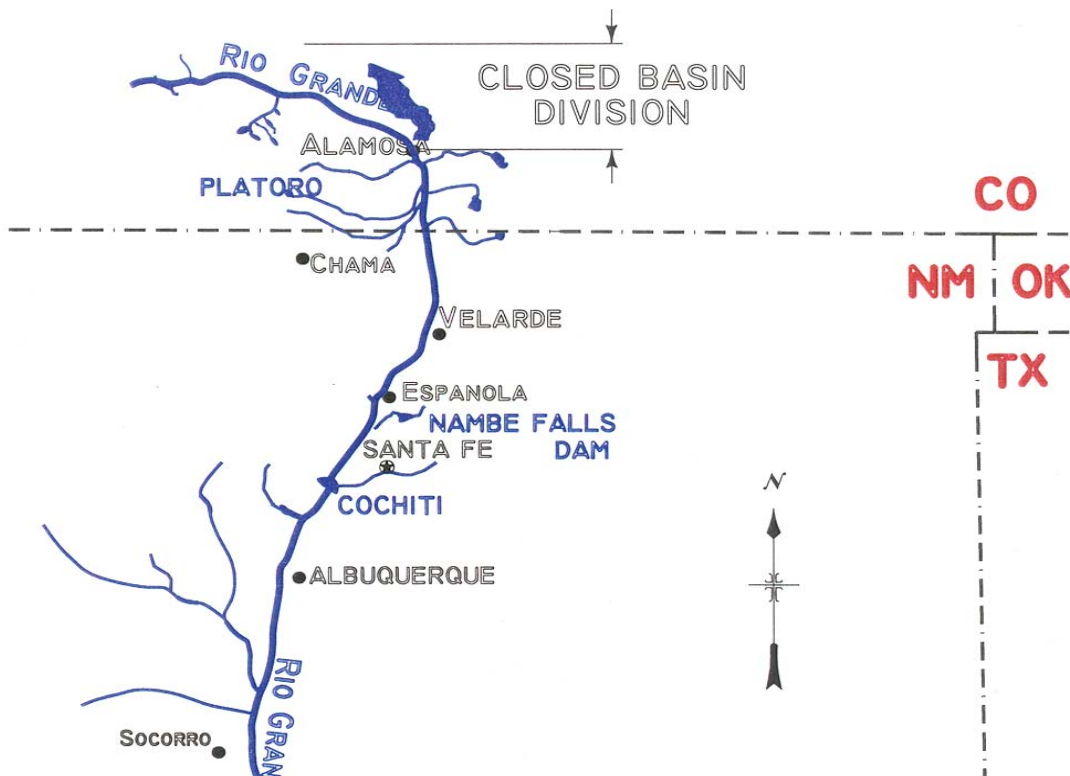


Figure 2: Area Map of San Luis Valley Project

## Closed Basin – Operations and Maintenance

### Operations

A total of 16,184 af of project water was delivered in Calendar Year (CY) 2005. Total delivery of Compact water to the Rio Grande for CY2005 equate to 10,720 af.

In CY2005 a total of 102 af non-compact water was delivered to the Rio Grande. On June 17, 18 and 19 of 2005 the running average of Total Dissolved Solids exceeded the limitation of less than 350 mg/l. Several factors contributed to this out of compact delivery, however, steps have been taken to minimize the contributing factors.

Closed Basin water deliveries in CY2005 included deliveries to the Blanca Wildlife Habitat Area, Alamosa National Wildlife Refuge, San Luis Lake, and the Rio Grande.

Natural inflows to San Luis Lake (SLL) are measured by the SLL inlet flume or estimated at the spillway and culverts. Natural inflow to San Luis Lake during CY2005 totaled 3,190 af. Project delivery to SLL through San Luis Lake Turnout was 1,518 af. No water was pumped from SLL through the San Luis Lake Pumping Plant.

**Background on San Luis Lake:** On September 3, 2002 the Division of Wildlife requested that the lake be evacuated to facilitate DOW's efforts to manage the aquatic weeds and fish population. On November 12, 2005 the six agencies agreed on a process to draw down the lake. On October 15, 2003 rotenone was applied to the lake and at that time the lake elevation was 7,512.4. Part of the agreement between the agencies was once the first significant runoff occurred (2,000 acre-feet) the Closed Basin Project water could be used to restore the lake to the Fish and Wildlife Coordination Act Report Elevation (7,519.3).

Total water deliveries to the BLM Blanca Wildlife Habitat Area for CY2005 equate to 800 af annual mitigation and 400 af Division of Wildlife exchange.

Total water deliveries to the Alamosa National Wildlife Refuge for CY2005 equate to 2,644 af annual mitigation.

Closed Basin Division water accounting for the 2005 calendar year is summarized in Table 1.

Table 1: San Luis Valley Project - Closed Basin Division Water Accounting (units are acre-feet)

San Luis Valley - Closed Basin Division	Blanca Wildlife Habitat Area			Parshall Flume		Alamosa National Wildlife Refuge (ANWR)				Delivery to the Rio Grande			Project Totals
	Ch03 Station 730 + 00	Ch04 Station 798 + 00	Month Totals	Total Passing Flume	Creditable Amount at Flume	Ch01 Chicago Turnout	Ch02 Mum. Turnout	Pumping Plant	Month Totals	Total at Flume Minus Delivery at ANWR	Credit Amount Delivered to Rio Grande & Not Used by ANWR	Non- creditable at Lobatos	
Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
January	0	0	0	1,561	1,561	0	0	0	0	1,561	1,561	0	1,561
February	0	0	0	1,466	1,466	0	0	0	0	1,466	1,466	0	1,466
March	15	15	30	1,386	1,386	66	196	0	262	1,124	1,124	0	1,416
April	49	46	95	1,589	1,589	388	435	0	823	766	766	0	1,684
May	0	0	0	1,630	1,630	163	344	0	507	1,123	1,123	0	1,630
June	50	99	149	1,335	1,233	155	180	0	335	1,000	898	102	1,484
July	109	120	229	1,063	1,063	22	29	0	51	1,012	1,012	0	1,292
August	102	104	206	1,093	1,093	0	0	0	0	1,093	1,093	0	1,299
September	153	145	298	1,026	1,026	184	239	0	423	603	603	0	1,324
October	64	129	193	397	397	109	134	0	243	154	154	0	590
November	0	0	0	189	189	0	0	0	0	189	189	0	189
December	0	0	0	731	731	0	0	0	0	731	731	0	731
Annual	542	658	1,200	13,466	13,364	1,087	1,557	0	2,644	10,822	10,720	102	14,666

Note: The project total of Table 1 does not reflect the 1,518 acre-foot delivery to San Luis Lake.

The project continues to provide Priority 1 (Compact) and Priority 2 (Mitigation) water deliveries. The San Luis Valley is in the midst of a severe drought and the water table in the unconfined aquifer has dropped significantly in some areas. Pumping levels are expected to remain at or near maintenance levels to allow the water table to recover while minimizing impacts to the surrounding area and preserving the integrity of existing project wells.

On October 20, 2005 the Operating Committee decided to allow pumping in the vicinity of the drawdown area in stage 5. On November 1, 2005 11 wells; SW168, SW159, SW152, SW 147, SW134, SW128, SW123, SW116, SW112, SW104, and SW97 previously throttled at 25% were opened to 75%. Minor decreases in monitoring well water levels occurred in this area but stayed within Closed Basin boundaries. Since decreases in monitoring well water levels were minor and remained in within Closed Basin boundaries, 11 additional wells that were previously throttled at 25% were opened to 75% on February 1, 2006. Those wells were: SW167, SW166, SW161,



SW160, SW157, SW151, SW148, SW127, SW124, SW113, and SW106.

As of December 31, 2005 a total of 130 Remote Terminal Units (RTU) have been upgraded. 20 more units have been ordered and should be installed in the next 60 days. These are positive steps in data collection and transmission of the Salvage Well data.

The 2004 annual report on vegetation monitoring within the project boundary summarized that an average of 1,982 acres within the project boundary indicated a significant decrease in vegetation from the preproject baseline. This amount is much less than the 8,460 acres that were predicted in the Final Environmental Impact Statement, and subsequently mitigated. An average of 615 acres within the project boundary indicated significant increase in vegetation from the preproject baseline.

The United States Geological Survey's (USGS) Pueblo Colorado Office continues to provide quality assurance/quality control (QA/QC) of the observation wells' network data for Reclamation. Reclamation received an excellent rating through the 2005 QA/QC program.

### **Maintenance**

Routine preventive maintenance and repair activities continued at salvage sites, canal structures, pumping plants, and shelterbelts. Other work included aquatic and noxious weed control, rodent control, and ice removal.

A total of 6 replacement wells were drilled in 2005, these replacement salvage wells range from 175 G.P.M. to 450 G.P.M. With the different well screen design and change in the gravel pack configuration these wells continue to prove that the re-drills have been very successful to the project and commitment to the Rio Grande Compact, the Alamosa National Wildlife Refuge, as well as the Blanca Wildlife Habitat Area. A total of 30 salvage wells have been re-drilled to date.

Repair and replacement of pumps and motors in the Salvage Wells vaults continue to be an on going process 16 defective pumps have been removed and replaced. The maintenance crew has chemically treated 26 salvage wells in our rehabilitation efforts in 2005.

Annual preventive maintenance of salvage wells is being performed. A total of 131 well sites were completed in 2005. Pipeline valve maintenance has been completed on 53 laterals valves.

In 2005, through a cooperative effort between Fish & Wildlife, Rio Grande Water Conservation District and the Bureau of Reclamation the maintenance group drilled a replacement well for the White Ranch, Fish and Wildlife. The well was pump tested; developed and electrical work was completed

Equipment that has been updated includes: LS 190 skid steer loader, JD 544 front end loader, and 20 FT dovetail trailer to haul heavy equipment and re-drill materials.

## **Water Quality**

Water quality monitoring of Closed Basin Division salvage wells, the Rio Grande, San Luis Lake, Head Lake and the conveyance channel continued throughout 2005. In addition to the standard water quality parameters, dissolved oxygen, nitrogen, and carbon dioxide continue to be monitored to assist canal grass carp survival studies and dissolved nitrogen reduction endeavors, in cooperation with Reclamation's Denver Technical Service Center personnel.

The Water Quality Laboratory participated in the Spring and Fall USGS Evaluation Program for Standard Reference Water Samples. The Laboratory continues to perform commendably on these audits.

The laboratory has implemented a software program to rapidly report and graphically display short and long-term trends in Project water quality data.

The laboratory has the capability to culture and identify "iron related bacteria" to support salvage well rehabilitation and bio-fouling mitigation efforts. All salvage wells are currently monitored for the presence of these bacteria. The laboratory will be cooperating with Reclamation's Denver Technical Service Center Ecological Research and Investigations division to determine acceptable bio-fouling mitigation strategies. In addition, the laboratory is developing the ability to quantitate "sulfate-reducing" and "manganese-oxidizing" bacteria.

The laboratory has acquired an **I**nductively **C**oupled **P**lasma-**M**ass **S**pectrometer (ICP-MS). This instrument has the capability to determine most elements at sub- $\mu\text{g/L}$  levels. The instrument has increased the laboratory's capabilities, efficiency and productivity concerning elemental analysis.

## **Rio Grande Water Conservation District**

The Rio Grande Water Conservation District (RGWCD) continues to perform civil maintenance on the project. Canal berms were maintained. Other work included maintenance of lateral access roads, mowing of canal berms and rights of way, removal of aquatic weeds from structures and sediment from the canal, repair of fences, and assisting Reclamation personnel with equipment, canal and well field maintenance. The RGWCD continued its involvement in the ground water monitoring program and continues maintenance of the irrigation systems for shelterbelt areas.

The RGWCD continues to assist Reclamation in the re-drill and rehabilitation efforts. The RGWCD in partnership with Reclamation obtained a \$200,000 grant from the Colorado Water Conservation Board Construction Fund to assist Reclamation in well re-drilling activities that are being planned as a multi-year effort aimed at regaining lost project production. This grant has been extended through June 2006.



# San Juan-Chama Project, Colorado – New Mexico

Reclamation's Albuquerque Area Office Water Management Division continued to maintain its Internet Web Page for Middle Rio Grande Water Operations during 2005. This web site provides the current year's monthly data for the operation and water accounting of the San Juan-Chama Project. To reach the Internet Web Page, type <http://www.usbr.gov/uc/albuq/water/> into a web browser.

## San Juan-Chama Diversion Dams

Work on the diversion dams included operation and maintenance of Blanco, Azotea, Oso and Little Oso diversion dams (Figure 3). Due to the above normal runoff flows there was an extensive amount of sediment deposited in all three diversion dams. The Chama Office worked long hours throughout the early fall to remove the sediment. Sediment and debris were removed from the diversion dams and from the inlets and outlets of the tunnels. The final report for the 2004 RO&M exam was submitted in February 2005.

As a requirement of the Corps of Engineers 404 permit, water quality monitoring was performed and water samples were obtained during maintenance operations on the Blanco Diversion Dam. Results of the investigation will be available in 2006.

## Heron Dam and Reservoir Operations

Diversions into the Azotea Tunnel began on February 18, and ended on November 15. The total amount diverted through the tunnel was 155,195 af. The running 10-year average increased from last year going from 80,988 af to 87,883 af. Heron Reservoir began the year at an elevation of 7,118.0 ft (111,005 af) and finished the year at an elevation of 7,144.85 ft (198,729 af). The March 2006 most probable streamflow forecasts for the Blanco and Navajo River Basins are 55% and 49% respectively of the 30 year average. Projected inflow at the current time should be approximately 40,000 ac-ft. Based on the current forecast for below average runoff this Spring, it is unlikely that Heron Reservoir will fill in 2006. Reclamation will maximize diversions as water becomes available in 2006.

The SJ-C contractors 2005 and waived 2004 annual allocations were delivered as shown in Table 3, for a total delivery in 2005 of 58,212 af. The remaining 2005 allocation is being held in Heron according to waivers which grant an extension for the delivery date for several contractors from December 31, 2005 to April 30, 2006.

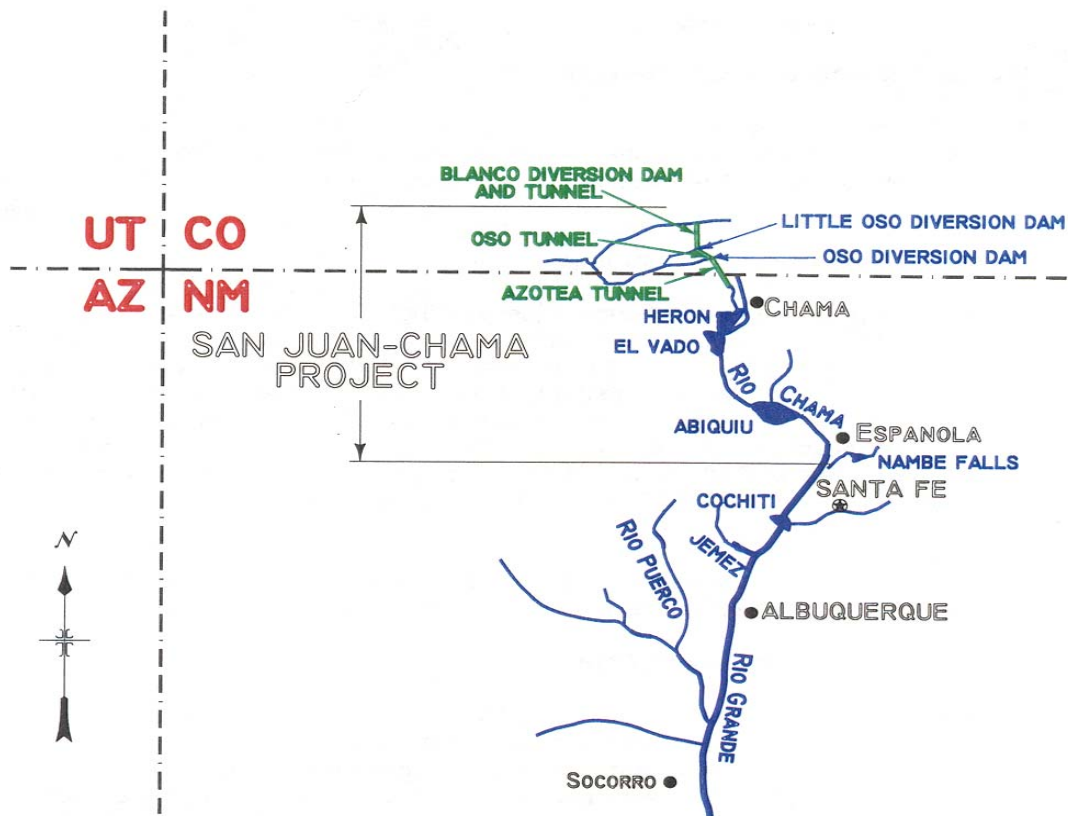


Figure 3: Area Map of the San Juan-Chama Project

Table 2: SJ-C Project - Diversions through Azotea Tunnel (units are acre-feet)

Azotea Month	Year										10 Year Total
	1996 (1)	1997 (2)	1998 (3)	1999 (4)	2000 (5)	2001 (6)	2002 (7)	2003 (8)	2004 (9)	2005 (10)	
January	0	349	0	0	0	0	0	0	0	0	349
February	0	76	0	0	0	0	0	0	0	93	169
March	1,400	9,299	2,329	4,152	536	1,512	743	1,170	11,505	1,931	34,577
April	16,370	13,890	11,516	12,516	15,864	19,284	4,499	11,366	15,427	31,721	152,453
May	30,760	43,720	41,822	32,806	20,987	51,092	865	26,613	30,164	45,146	323,975
June	5,820	48,442	28,598	39,659	5,019	29,283	204	18,816	20,390	50,210	246,441
July	2,620	11,634	8,846	12,734	106	4,643	0	669	2,139	13,347	56,738
August	70	9,108	1,668	13,019	229	4,455	0	487	237	3,779	33,052
September	210	3,406	153	4,015	0	313	0	3,340	1,973	3,360	16,770
October	270	2,350	200	0	0	0	0	246	1,821	4,873	9,760
November	980	0	1,188	0	0	0	0	0	1,218	735	4,121
December	30	0	381	0	0	0	0	0	12	0	423
Annual	58,530	142,274	96,701	118,901	42,741	110,582	6,311	62,707	84,886	155,195	878,828

Table 3: SJ-C Project - Water Deliveries from Heron Reservoir (units are acre-feet)

SJ-C Heron Release	MRGCD	Santa Fe	Cochiti	City of Albuquerque	Pojoaque Unit	Taos	County of Los Alamos	City of Española	Twining Sanitation	Village of Los Lunas	Town of Bernalillo	Belen	Red River	Jicarilla Apache	San Juan Pueblo	Uncontracted	Total
Month																	
Allocation	20,900	5,605	5,000	48,200	1,030	400	1,200	1,000	15	400	400	500	60	6,500	2,000	2,990	96,200
January	0	0	629	0	522	0	0	0	0	266	0	10	0	0	0	0	1,427
February	0	1,200	1,450	0	0	0	0	0	0	0	0	0	0	0	0	0	2,650
March	0	0	201	0	0	0	0	0	0	0	0	0	0	0	0	0	201
April	0	1,434	0	0	0	399	1,200	1,000	0	0	0	158	60	180	2,000	0	6,431
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
July	3,738	0	0	0	0	0	0	0	0	0	0	0	0	0	241	2,990	6,969
August	4,602	0	0	0	0	0	0	0	0	0	0	0	0	575	1,759	0	6,936
September	1,553	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,553
October	197	0	0	0	0	0	0	0	0	0	0	0	0	1,600	0	0	1,797
November	2,294	0	0	7,057	0	0	1,200	0	0	0	0	0	0	4,325	0	0	14,876
December	8,516	0	0	2,856	1,869	400	0	1,000	2	223	400	46	60	0	0	0	15,372
2005 CY Total	20,900	2,634	2,280	9,913	2,391	799	2,400	2,000	2	489	400	214	120	6,680	4,000	2,990	58,212

Table 4: SJ-C Project - Monthly Water Storage in Heron Reservoir (units are acre-feet)

Heron Storage	Inflow		Outflow		San Juan Chama Loss	End-of-Month Content			Elevation (feet)
	Rio Grande	San Juan Chama	Rio Grande	San Juan Chama		Rio Grande	San Juan Chama	Total	
Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
December 2004						-361	111,366	111,005	7,118.00
January	1,791	0	156	1,427	0	1,274	109,939	111,213	7,118.08
February	4,031	93	5,306	2,650	0	-1	107,382	107,381	7,116.59
March	2,665	1,931	2,377	201	0	287	109,112	109,399	7,117.38
April	5,644	31,658	3,418	6,431	0	2,513	134,339	136,852	7,127.14
May	3,382	45,056	5,529	0	0	366	179,395	179,761	7,139.88
June	104	50,110	104	0	1,140	366	228,365	228,731	7,152.15
July	702	13,320	916	6,969	2,218	152	232,498	232,650	7,153.06
August	733	3,771	915	6,936	1,471	-30	227,862	227,832	7,151.94
September	111	3,353	111	1,553	1,329	-30	228,333	228,303	7,152.05
October	116	4,863	116	1,797	59	-30	231,340	231,310	7,152.75
November	110	735	110	14,876	1,821	-30	215,378	215,348	7,148.97
December	108	0	108	15,372	1,247	-30	198,759	198,729	7,144.85
Sub-total	19,497	154,890	19,166	58,212					
Adjustment						-350	(A)		
Annual		174,387		77,378	9,285	-380	199,109	198,729	

## **Heron Dam Facility Review and Safety of Dams Programs**

The following work was completed for Heron Dam during 2005:

- Facility Reliability Rating
- Annual Emergency Action Plan Review, Drill, and Communication Directory Update
- Completed the Security Plan for Heron Dam
- The Dam Operator attended Dam Tender Training
- Completed the 2005 Visual Land Slide Survey
- Annual Site Exam

## **Pojoaque Tributary Unit - Nambé Falls Dam and Reservoir**

Nambe Falls began 2005 with the reservoir at elevation 6,801.37 ft providing a storage volume of 807 af. During the winter releases, averaged around 1 ft<sup>3</sup>/s to maximize conservation storage as agreed to by the Pojoaque Valley Irrigation District and Indian water users. The reservoir filled and spilled in 2005. The maximum elevation for the year was 6,827.01 ft (1,944 af) on May 23. The reservoir began falling after that date as irrigation releases were made. The reservoir began the year at the lowest point of the year at an elevation of 6,801.37 ft (807 af). Nambe Falls Reservoir ended 2005 at elevation 6,825.79 ft (1,873 af). Cyclical operations of Nambe Falls Reservoir consist of non-irrigation season operations and irrigation season operations. During non-irrigation season (November through April), all inflow in excess of the bypass requirement of 0.5 ft<sup>3</sup>/s is stored until an elevation of 6,825.60 ft is reached. Once an elevation of 6,825.60 ft is attained, the outlet gates are regulated weekly to stabilize the reservoir at 6,825.60 ft, or an elevation determined by 100 percent ice cover. An uncontrolled spill begins at elevation 6826.6 ft, which is the top of the spillway crest.

During irrigation season (May through October), water is stored and released on demand to meet downstream requirements. A depletion of 1,866 af was calculated for Nambe Falls operations for the entire year. The depletion amount was released from Heron and Abiquiu reservoirs during December 2005.

Table 5: SJ-C Project - San Juan-Chama Water at Otowi (units are acre-feet)

SJ-C at Otowi	Release from Heron	Heron Release Stored in El Vado	Release from El Vado	Total Below El Vado	Release from or Storage in Abiquiu	Trans. Losses	Nambe Falls Use Above Otowi	Return Flow Credit - Pojoaque Unit	San Juan Water at Otowi
Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
January	1,427	266	0	1,161	-417	19	192	21	554
February	2,650	0	0	2,650	-875	45	552	20	1,198
March	201	0	0	201	3	4	319	19	-100
April	6,431	0	0	6,431	-5,283	81	25	17	1,059
May	0	0	2,022	2,022	-2,156	21	20	16	-159
June	0	0	0	0	0	0	1	15	14
July	6,969	0	513	7,482	-862	142	47	18	6,449
August	6,936	1,724	0	5,212	-210	102	120	78	4,858
September	1,553	0	1,480	3,033	1,021	70	252	30	3,762
October	1,797	197	0	1,600	-222	30	452	60	956
November	14,876	2,294	0	12,582	-12,036	143	251	26	178
December	15,372	1,663	0	13,709	-10,608	179	41	24	2,905
Annual	58,212	6,144	4,015	56,083	-31,645	836	2,272	344	21,674

Table 6: SJ-C Project - Monthly Water Storage in Nambé Falls Reservoir (units are acre-feet)

Nambé Falls Monthly	Inflow	Outflow			Reservoir Losses	Total Outflow + Losses	End of Month	
		Bypassed	Storage Release				Content	Elevation
			Operational	Irrigation				
Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
December 2004							876	6,801.17
January	237	45	0	0	1	46	1,067	6,808.75
February	585	33	0	0	2	35	1,617	6,821.02
March	650	331	0	0	11	342	1,925	6,826.70
April	1,657	1,632	0	0	18	1,650	1,932	6,826.81
May	3,487	3,467	0	0	20	3,487	1,932	6,826.81
June	2,245	2,240	0	85	23	2,348	1,829	6,825.01
July	818	665	0	638	110	1,413	1,234	6,812.86
August	653	525	0	93	8	626	1,261	6,813.49
September	681	303	0	357	127	787	1,155	6,810.98
October	899	447	0	0	1	448	1,606	6,820.82
November	339	86	0	6	10	102	1,843	6,825.25
December	345	304	0	9	2	315	1,873	6,825.79
Annual	12,596	10,078	0	1,188	333	11,599	1,873	6,825.79



## **Nambé Falls Dam Facility Review and Safety of Dams Programs**

During 2005, Nambe Falls Dam had the following activities implemented or completed:

- Instrumentation drawings for the dam are being updated and are scheduled for completion by the end of 2007
- Scribe Marks for assisting in monitoring dam movement have also been implemented. Scribe Marks should be completed in 2007
- The next Comprehensive Facility Review is scheduled to be completed in May of 2007
- A previous item implemented was the testing of the backup internal generator. Through the testing, it was discovered that the generator had not been working properly for some time and needed repairs. Repairs were completed during 2005. The generator was tuned-up and lines and valves that were leaking were replaced
- The Pojoaque Valley Irrigation District plans to send the new dam tender to the dam training workshop in early 2006

## **M&I Water Use - National Environmental Policy Act Compliance**

Reclamation served as the lead federal agency for the City of Albuquerque's Drinking Water Supply Project EIS which addressed the City of Albuquerque's plan to divert, treat, and directly use its SJ-C water for municipal and industrial purposes. The Record of Decision was signed June 1, 2004. The City is currently constructing the project.

Reclamation is involved in City and County of Santa Fe water supply projects. The City, County, and a private developer (Las Campanas) are working with the U.S. Forest Service and the Bureau of Land Management on an EIS to address effects of the proposed Buckman Water Diversion Project. Reclamation is serving as a cooperating agency on the Buckman EIS. Currently, Reclamation is working with the agencies and the project proponents to resolve endangered species issues. A Final EIS and ROD are expected this year.

Reclamation assisted the City of Española, New Mexico with an Environmental Assessment (EA) of construction of drinking water treatment facilities and diversion of the City's San Juan-Chama Project water. The initial work is authorized by Congress under Public Law 102-575. The EA for this project is on hold pending a decision by the City and the Corps of Engineers regarding the point of diversion and subsequent engineering of the structure for the diversion and EA. Although the EA is currently on hold, it is nearing completion and Public Law 108-354 provides 25% federal funding for construction of the filtration facility.

An environmental assessment of the Jicarilla Apache Nation Water Subcontract to the City of Santa Fe was prepared and a Finding of No Significant Impact was issued by Reclamation in October 2005.

During 2005, the environmental assessment (EA) process for the proposal to amend the six existing water service contracts to repayment contracts was resumed. The City and County of Santa Fe, City of Española, Village of Los Lunas, County of Los Alamos, Village of Taos Ski Valley, and Town of Taos are the seven contractors who have requested the contract

conversions. In September 2005, Aspen Environmental Group was contracted to complete the NEPA documentation. A public scoping meeting was held in Santa Fe in November 2005. A final EA and anticipated finding of no significant impact is projected to be completed in early spring 2006.



## Middle Rio Grande Project, New Mexico

The *Middle Rio Grande Project* (Figure 4) consists of El Vado Dam and Reservoir and irrigation and drainage facilities in the middle Rio Grande valley. The project also entails river channel maintenance from Velarde, New Mexico, southward to Caballo Reservoir, and the Low Flow Conveyance Channel (LFCC) south of San Acacia, New Mexico. Irrigation water is provided to the Middle Rio Grande Conservancy District (MRGCD) which can supply water to approximately 50,000 to 70,000 acres of land.

## New Mexico Relinquishment of Rio Grande Compact Credit

Per the Rio Grande Compact Article I definition, the usable water in Project storage (Elephant Butte and Caballo Reservoirs together) was below 400,000 af for much of 2005. Article VII of the Rio Grande Compact stipulates that when usable water in Project storage is below 400,000 af, no “native Rio Grande flows” will be stored in post-1929 reservoirs upstream of Elephant Butte Reservoir in New Mexico and Colorado unless relinquishment of credit waters in Elephant Butte Reservoir occurs.

No Emergency Drought Water was captured by Reclamation under the Emergency Drought Water Agreement (EDWA) in 2005. The balance of Emergency Drought Water available for capture and storage by Reclamation and the MRGCD during 2006 is 24,565 af.

Reclamation had 16,062 af of Emergency Drought Water stored in El Vado Reservoir for use on behalf of listed endangered species as of December 31, 2005. MRGCD had 2,987 af of Emergency Drought Water in El Vado Storage on the same date.

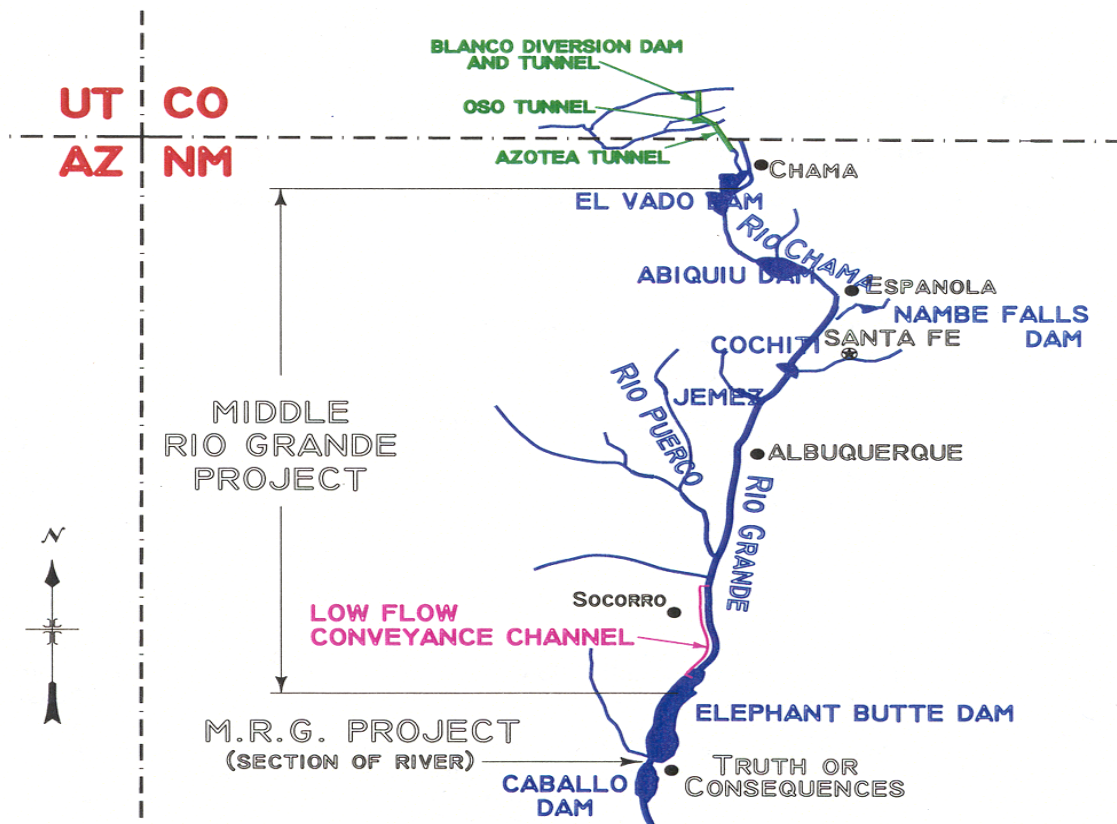


Figure 4: Area Map of the Middle Rio Grande Project

## El Vado Dam and Reservoir Operations

Due to adequate supplies of inflow into the Middle Rio Grande Valley, no Emergency Drought Water was captured during the 2005 calendar year. El Vado's total storage peaked at 157,931 af on July 7, which was comprised of 123,234 ac-ft of Rio Grande water which was captured for use by the MRGCD after the lifting of Article VII restrictions, 12,000 af of native Rio Grande water for the senior water rights of the Six Middle Rio Grande Pueblos, 19,470 af of Emergency Drought Water carried over from previous years, and 3,442 af of stored SJ-C water.

MRGCD began the year with very little native Rio Grande water in storage for meeting their irrigation demand during 2005. MRGCD used 9,408 af of their 2005 Heron SJ-C allocation to repay the City of Albuquerque for water borrowed in 2004. The remaining 11,492 af was moved to El Vado and Abiquiu where some was released for irrigation needs and the rest stored for use in 2006. Approximately 4,149 af of MRGCD's 2005 SJ-C allocation is being carried over to 2006 in El Vado.

12,000 ac-ft was stored for Prior and Paramount needs of the six Middle Rio Grande Pueblos. 7,000 ac-ft was stored while New Mexico was still under Article VII restrictions. This water was released to Elephant Butte beginning November 15 after the end of irrigation. The remaining 5,000 ac-ft that was stored after Article VII restrictions were lifted reverted to project storage

after November 15.

Reclamation released no Emergency Drought Water from El Vado during 2005 on behalf of listed endangered species. Reclamation had 16,062 ac-ft of Emergency Drought Water remaining in El Vado Reservoir on December 31 which is being carried over for use in 2006.

The total SJ-C water in storage at the end of the year was 6,195 af. Table 7 provides a summary of monthly operations and water accounting for El Vado Reservoir.

Table 7: Reservoir Operation for El Vado Dam (units are acre-feet)

El Vado Reservoir Operation	Inflow		Outflow		Losses		EOM Content		
	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Total
Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
December 2004	-8,393	1,343	2,095	1,343	86	95	20,579	5,244	25,823
January	4,131	1,427	3,824	1,161	189	-27	20,697	5,537	26,234
February	10,501	2,650	7,458	2,650	188	-19	23,552	5,556	29,108
March	10,543	201	6,029	201	144	11	27,922	5,545	33,467
April	79,636	6,431	80,212	6,431	240	19	27,106	5,526	32,632
May	205,388	0	120,425	2,022	299	33	111,770	3,471	115,241
June	49,127	0	6,672	0	832	23	153,393	3,448	156,841
July	7,034	6,969	9,014	7,482	1,075	21	150,338	2,914	153,252
August	4,206	6,936	21,720	5,212	510	53	132,314	4,585	136,899
September	2,596	1,553	26,361	3,033	473	1,052	108,076	2,053	110,129
October	5,119	1,797	6,074	1,600	196	1	106,925	2,249	109,174
November	-618	14,876	2,139	12,582	208	7	103,960	4,536	108,496
December	-1,890	15,372	1,715	13,708	114	4	100,241	6,196	106,437
Annual	375,773	58,212	291,643	56,082	4,468	1,178			

## El Vado Dam Facility Review and Safety of Dams Programs

During 2005 the following work was completed for El Vado Dam:

- Facility Reliability Rating
- Annual Emergency Action Plan Review, Drill, and Communication Directory Update
- Annual Site Exam
- Work on the incomplete Safety of Dams recommendations, 1998-SOD-A and 2001-SOD-C, associated with the structural stability of the spillway was initiated in the spring/summer of 2005
- A Risk Analysis DSAT meeting for the above SOD recommendations was conducted in the summer/fall of 2005
- The 2005 Region landslide survey
- The Security Plan for El Vado Dam
- The Dam Operator attended Dam Tender Training
- Identified Environmental Issues with the shale removal on the right abutment of the spillway
- The wet spot that was identified a few years ago continues to be monitored on a monthly basis, with no apparent changes

- General Maintenance was completed

## U.S. Army Corps of Engineers' Related Reservoir Operations

Abiquiu Dam and Reservoir is a U.S. Corps of Engineers facility. Public Law 97-140 authorized storage of up to 200,000 af of SJ-C water in Abiquiu Reservoir. Adjustments for sediment reduced the sum of the available storage allocations to 183,246 af in 2005. The amount of SJ-C water in storage peaked on December 31 at 131,736 ac-ft. The year finished with a net gain of native Rio Grande water which was attributed to making a release of SJ-C after-the-fact for Nambe Falls' depletions. Due to this accounting, a like amount of Rio Grande water ended up being stored. This water was released in the first few days of 2006. Table 8 provides a summary of monthly operations and water accounting for Abiquiu Reservoir. A storage agreement with the City of Albuquerque, allows for Reclamation to store up to 20,000 ac-ft of supplemental water in Albuquerque's storage space in Abiquiu Reservoir. This agreement expires December 31, 2006.

Table 8: Reservoir Operation for Abiquiu Dam (units are acre-feet)

Abiquiu Reservoir Operation	Inflow		Outflow		Losses		EOM Content			
	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Rio Grande	San Juan - Chama	Sediment	Rio Grande	San Juan - Chama	Total
Month	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
December 2004	13,560	1,505	12,727	3,793	0	209	1,126	831	110,277	112,234
January	7,216	1,208	6,315	791	2	-52	1,127	-52	110,746	111,821
February	9,789	2,386	9,740	1,511	4	227	1,129	0	111,394	112,523
March	7,973	433	7,883	436	-1	470	1,129	90	110,921	112,140
April	89,429	6,204	63,823	921	55	940	1,334	25,751	115,264	142,349
May	137,400	2,156	106,411	0	1,060	960	1,672	57,804	116,460	175,936
June	17,010	0	75,334	0	565	1,742	1,678	40	114,718	116,436
July	10,176	7,068	9,767	6,206	1	2,375	1,684	450	113,205	115,339
August	25,003	5,170	25,447	4,960	-4	1,354	1,700	5	112,061	113,766
September	28,482	3,316	28,077	4,337	-4	865	1,717	406	110,175	112,298
October	7,148	1,168	7,543	946	-2	620	1,718	8	109,777	111,503
November	5,419	12,430	5,582	394	-1	446	1,722	-156	121,367	122,933
December	6,187	13,496	5,374	2,888	2	243	1,727	660	131,732	134,119
Annual	351,232	55,035	351,296	23,390	1,677	10,190				

## **Cooperative Programs with the State of New Mexico**

### **Water Salvage work for the Middle Rio Grande Project**

Reclamation cooperates with the New Mexico Interstate Stream Commission (NMISC) on water salvage, drain improvement, and river maintenance activities. During 2005, State funds were used for equipment operation and maintenance, as well as various construction efforts.

In a continuing effort to improve information sharing and coordination, monthly work progress and expenditure reports of on-going projects funded by the State of New Mexico (State) through the Cooperative Program were provided to NMISC. An annual report was provided as well.

Given the low reservoir levels in Elephant Butte Reservoir and relatively low river flows for the year, it was important to focus attention on the temporary channel work. As a result, no water salvage drain maintenance work was performed in 2005.

The State provided cost share funds to aid in continuation of construction of the Temporary Channel into Elephant Butte Reservoir for the 7-mile reach upstream of Nogal Canyon. The funds were used for the operation and maintenance of the amphibious excavators and support equipment. Additional efforts were focused on removal of a sediment plug that formed in the river in the Tiffany area. Details regarding the Temporary Channel and Tiffany Sediment Plug removal projects are provided in the following section.

### **Elephant Butte and Caballo Reservoir Vegetation Management Cooperative Agreement**

Under a Cooperative Agreement with the State of New Mexico, Reclamation has continued maintenance on lands within the Caballo Reservoir and Elephant Butte Reservoir projects. During 2005, 5,636 acres of woody phreatophytes were controlled at Caballo Reservoir including herbicide treatments to 750 acres. In addition, Reclamation has obtained funding under the DOI Science and Technology Invasive Species Initiative to continue cooperative studies of saltcedar control methods, pesticide monitoring, and Evapotranspiration (ET) measurements.

### **Temporary Channel into Elephant Butte 2000**

River disconnection has been an issue at the headwaters of Elephant Butte since the early 1950's. The contributing factors for the occurrence of disconnection are many: the valley slope is very slight, the incoming sediment load is high, the clay deposits are highly cohesive, and vegetation growth is extremely aggressive. During dry climactic periods when the reservoir pool decreases rapidly, all of these factors make it difficult for the river channel to cut its own channel thereby maintaining a connection with the reservoir pool.



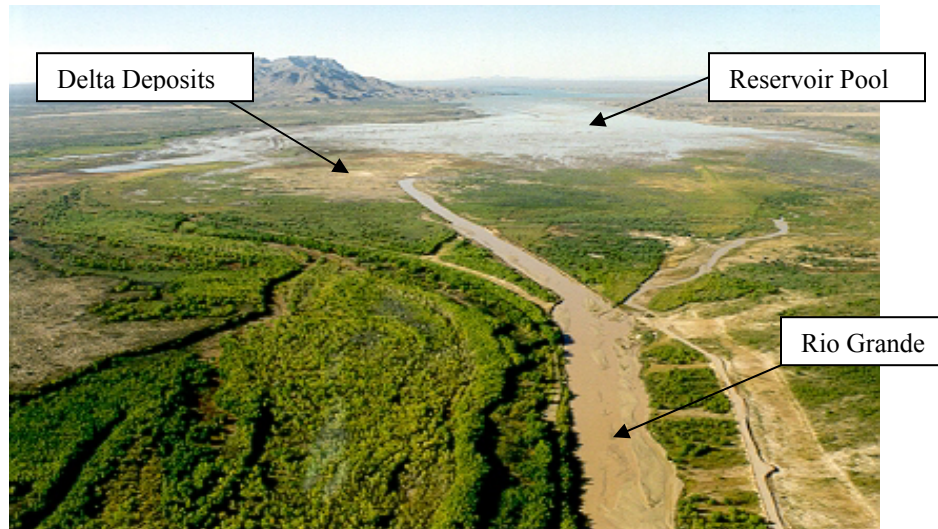


Photo 1: Photograph showing the Rio Grande's inability to maintain a channel through the delta (1998)

The Temporary Channel 2000 is approximately 7 miles in length, ending at Nogal Canyon and having an average width of 250 feet and depth of 2 feet. The excavated material is being placed on either side of the constructed channel to form 3 ft high berms.

In 2005, a spring runoff occurred that was larger than has been seen in recent years. The Temporary Channel was able to pass these high flows to the reservoir pool, however, maintenance needs were noticed during and after the runoff. During the high flows, several areas were noted where berms needed to be repaired or modified to keep the channel functional. A portion of the Temporary Channel access road around EB-26 was also washed out as a result of the high flows (see Photo 2). This wash-out effectively cut off access to the Temporary Channel from the northern San Marcial area. As flows subsided in the summer, sediment deposited in on bars and islands throughout the reach. This created a narrow channel in several places and decreased the high flow capacity of the channel.



Photo 2: Looking south at washout around EB-26 on the Temporary Channel access road (2005)

In September 2005, maintenance activities were resumed on the Temporary Channel 2000. Maintenance activities included berm repairs, restoration of a low flow channel width between 50 and 75 feet, and bar lowering to increase the high flow capacity through this reach. In October and November of 2005 the last remaining environmental feature, the groundwater pond, was also constructed. The groundwater pond was eventually located north of EB-32 and is shown in the picture below (Photo 3). In addition to these tasks, the access road to the Temporary Channel from the north was constructed in the latter part of 2005 and completed in the beginning of 2006. As repairing the existing road location would have been cost prohibitive, the road was re-routed to the west between EB-26 and EB-29. Material to construct the roads was obtained from Reclamation's Valverde pit. Continued maintenance for 2006 will be largely dependent upon funding received via the Cooperative program with the State of New Mexico.



Photo 3: Temporary Channel 2000 groundwater pond (2005)

## **Elephant Butte Temporary Channel 2002**

This project is an extension of the Temporary Channel 2000 project, which ends at Nogal Canyon. The Temporary Channel 2002 project consists of construction and maintenance of an 11-mile channel from Nogal Canyon through the Narrows. This project provides effective conveyance of water and sediment through the currently dry portion of Elephant Butte Reservoir. This portion of the channel has been constructed by the contractor hired by NMISC, Wilco Marsh Buggies. A continuous, 150-foot-wide channel was completed between Nogal Canyon and the downstream end of the Narrows in late 2003. Work in 2005 consisted primarily of increasing conveyance capacity, improving the stability of berms in the area upstream of the Narrows, repairing breaches in berms, and removing sediment that had accumulated in the channel during spring runoff. Sediment deposition during spring runoff 2006 and future years will likely result in the need for maintenance to achieve adequate channel functionality.

## Elephant Butte Temporary Channel 2004

The Temporary Channel 2004 extends from the downstream end of the Temporary Channel 2002 (at the downstream end of the Narrows) to Elephant Butte Dam. The project provides effective conveyance to the reservoir pool. Some or all of this area is underwater, only becoming exposed when reservoir levels are low. In 2005, a small length of the channel about a mile downstream of the Narrows was plugged with accumulated sediment. A contractor hired by NMISC, Wilco Marsh Buggies, excavated a channel through this sediment and constructed a berm to prevent water from flowing out of the channel and becoming ponded in an area to the west (Photo 4). Additionally, minor flow obstructions were removed in the area between the downstream end of the Narrows and the reservoir pool.



Photo 4: Excavated channel and berm downstream of the Narrows, October 2005

## River Maintenance

### River Maintenance Priority Sites

Reclamation has identified numerous priority sites along the Middle Rio Grande Project reach where bank erosion or reduced channel capacity could cause levee failure resulting in shallow overland flooding, reduction of water delivery, and destruction of canals and drains.

Reclamation's efforts on addressing river maintenance work at these sites include contract administration, data collection, geomorphic and sediment investigations, design studies, alternative evaluation, design and development of construction drawings, material supply and development, lands access, environmental compliance, project and construction management, and construction maintenance. Due to extreme regional drought, Elephant Butte Reservoir pool is below the "Narrows" at the low levels not experienced in the last 20 years, resulting in a need to continue channel maintenance through the delta to effectively deliver water for agricultural use on about 178,000 acres of irrigated land, for municipal use by the City of El Paso, for delivery to the Republic of Mexico, and for generating electric power.

### La Canova

In March 2005, construction maintenance work was completed at this site. At this location the river is approximately 15 ft. from the La Canova Acequia. This project involved placing about 1000 cubic yards of riprap toe protection with the use of about 2500 linear feet of BioD blocks in a series of five lifts (see Photo 5 and Photo 6). The project experienced discharges (6510 cfs at Embudo gage) above the design discharge of 5,000cfs and adequately protected the bankline and La Canova Acequia.



Photo 5: Looking upstream at the La Canova site during high flows, the acequia is at the far left corner the photograph (May 2005)



Photo 6: Looking upstream at the La Canova site after runoff (July 2005)

### **Salazar Pit**

In October 2005, Reclamation completed construction maintenance at the Salazar Pit site. This project involved stabilizing a riprap mine site that Reclamation utilized from the mid-1980s to the mid-1990s. Excess arroyo runoff and sediment deposition resulting from the disturbance caused by the mining operation was problematic at this site. The sediment depositional zone included a county road leading to a number of area residences and the driveway of the landowner.

The project provides for reduced material deposition and includes four energy dissipation weirs (Photo 7) and two areas of channel widening. The project involved placement of approximately 6,600 cubic yards of riprap material for the weir structures and about 10,000 cubic yards of excavation earthwork for the channel work.



Photo 7: Gabion weir structure at the Salazar Pit, equipment is placing apron material on upstream side of weir (July 2005)

### **San Ildefonso Pond**

The primary concern at the San Ildefonso Pond priority site is that the east bank of the Rio Grande is very close to the berm surrounding the pond; the distance between the edge of the river channel and the toe of the berm is as little as 50 feet in some areas. Furthermore, the bend upstream of the pond was observed to be eroding very actively during the 2005 spring runoff (Photo 8). Design work for a river maintenance project at this site began in 2005. Construction is planned for 2006.



Photo 8: Bank erosion upstream of the San Ildefonso Pond, July 2005

### **Santa Fe River Confluence**

Design and construction of a river maintenance project to address a priority site on the Pueblo of Cochiti were completed in 2004 (Photo 9). The project site is located on the east side of the Rio Grande at the confluence with the Santa Fe River. A short portion of the levee was moved away from the river and armored with riprap to reduce the possibility of levee erosion during high flow conditions. The project required movement of approximately 7,000 cubic yards of earth material and placement of approximately 800 cubic yards of riprap. Additionally, the area between the levee and the river was planted with native vegetation to stabilize the soil and increase erosion resistance. The final component of the project, seeding native grasses, was completed in July 2005.



Photo 9: Santa Fe Confluence priority site before reseeding, July 2005

### **Cochiti Priority Sites**

There are two priority sites on the Pueblo of Cochiti: one (at River Mile 231.3) is on the west side of the Rio Grande about 1 mile downstream of Cochiti Dam, and the other (at River Mile 228.9) is on the east side, about 3 miles downstream of the dam. At River Mile 231.3, the west bank of the channel has migrated beyond the jetty jack line (Photo 10) and is very close to a road and some agricultural fields. At River Mile 228.9, the main channel is on the west side of a large island, and the secondary channel is on the east side. The secondary channel carries water year-



round. The concern at this site is that the secondary channel is slowly, but steadily, migrating eastward (Photo 11) toward the levee and riverside drain. Alternative analysis for these sites was completed in 2005, and designs will be developed in early 2006.



Photo 10: West bankline of the Rio Grande at River Mile 231.3 on the Pueblo of Cochiti, July 2005



Photo 11: Eroding bankline at River Mile 228.9 on the Pueblo of Cochiti, July 2005

### **Santa Ana**

A large scale river maintenance project at Santa Ana Pueblo is nearly complete. The major features; river realignment and construction of a gradient restoration facility, are complete. The primary activity during 2005 was redistributing piles of excess sediment to facilitate their removal during the high spring flows (Photo 12); approximately 60,000 cubic yards of sediment was removed. In 2006, Reclamation will determine how to redistribute the remaining sediment to best accomplish the project's goals. Additionally, a line of riprap at the upstream end of the gradient restoration facility will be extended to protect against erosion. Additional floodplain grading and native vegetation planting was completed during 2004. The overall project design requires average or higher spring runoff flows to develop features to their final configurations. Therefore, the duration of ongoing activities is dependent on hydrologic conditions.



Photo 12: Erosion of excess sediment at Santa Ana, June 2005

### **Bernalillo Area Priority Sites**

The Bernalillo Area priority sites consist of two river maintenance sites: the Bernalillo and Sandia priority sites, located approximately 0.5 and 1.5 miles, respectively, downstream of the U.S. Highway 550 Bridge (Photo 13). A low level threat to public safety and health exists at both of these sites, owing to the proximity of the river channel to the east levee system. The active river channel in this reach is incising, yet is higher than the lands outside of the levee. At both sites, the main channel is actively eroding toward the levee and is currently about 50 to 70 feet away. Reclamation provided short-term bankline erosion protection at both sites in 2003.

In 2005, Reclamation selected preferred alternatives for river maintenance actions at both sites. For the Bernalillo priority site, the preferred alternative consists of installing a series of bendway weirs along the east bankline, realigning the river slightly to the west, and constructing a secondary channel in the eastern portion of the floodway. For the Sandia priority site, the preferred alternative consists of realigning the channel further away from the east levee, increasing sinuosity to improve habitat, and installing bendway weirs to make the east bankline more resistant to erosion. Both projects are scheduled to be completed in 2006.

# Bernalillo Area Priority Sites

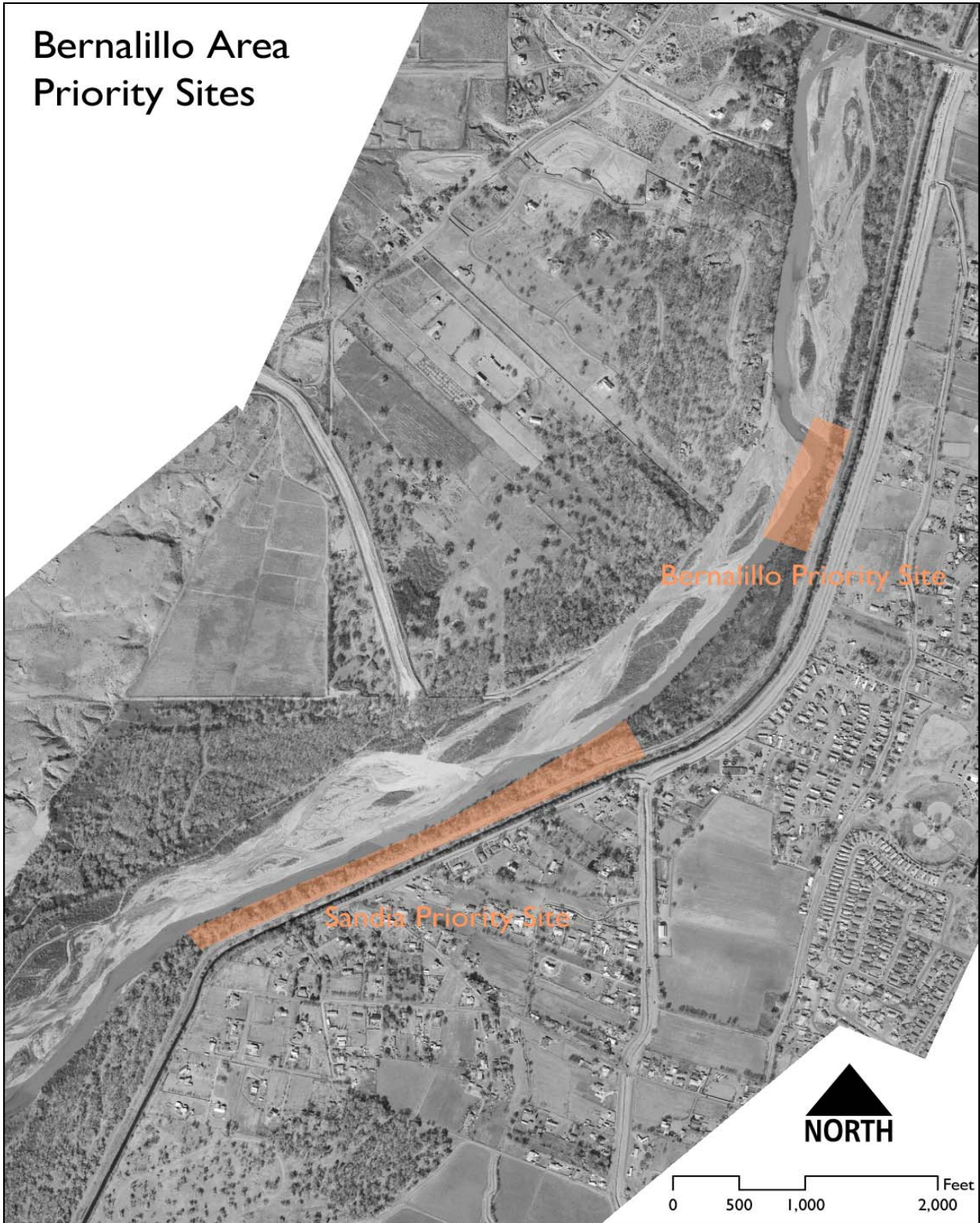


Photo 13: Bernalillo and Sandia priority sites

### **San Acacia to Escondida Reach Priority Sites**

Reclamation is currently performing construction at the River Mile 114 and 113 priority sites, approximately 2 miles downstream of San Acacia Diversion Dam. Reclamation is also pursuing plans to address river maintenance needs at River Mile 111. All three of these locations are in the 11 mile reach between San Acacia Diversion Dam and the Escondida Bridge located north of Socorro, New Mexico. At the three locations, channel incision, lateral channel migration, and bank erosion threaten the integrity of the levee system.

At the first and second sites, River Mile 114 and 113, the project involves moving the levee and LFCC to the west approximately 1,500 lineal feet away from the river. Work is progressing well and is expected to continue through the end of 2006.

The current design is for a channel and pipe crossing which is under the San Lorenzo Arroyo, with a flow capacity of 500 cubic feet per second (cfs). Should the design flow increase modifications can be incorporated in the channel as well as to the pipe crossing; although additional pipe barrels will have to be added. The construction work is being accomplished by the Socorro Field Division and through a contract issued to AJAC Enterprises in August, 2005. In addition to the channel work and the pipe installation, a sheet pile grade control structure is being constructed in the San Lorenzo Arroyo east of the pipe crossing.

Major items of work include: 1) Clear and grub vegetation, and excavate for new LFCC channel (approximately 10,800 feet). Construct spoil levee adjacent to new LFCC channel and place riprap on side slopes of new LFCC. 2) Construct sheet pile grade control structure along San Lorenzo Arroyo. 3) Construct 10-foot diameter, 598 foot-long reinforced pipe crossing under the San Lorenzo Arroyo. 4) Remove riprap from side slopes of the existing LFCC channel and fill in with material from existing levee. 5) Create new potential floodplain between the new levee position and the channel. 6) Plant cottonwood poles and other native species within the project area.



Photo 14: Photo taken 06-10-05, looking south at San Lorenzo Arroyo Settling Basin. Photo shows the area cleared of vegetation for excavation of the realigned Low Flow Conveyance Channel.



Photo 15: Photo taken on 05-16-05 at Station 1878+00. Shown are scrapers excavating for the new Low Flow Conveyance Channel. Photo taken by Rudy Bernal, Bureau of Reclamation.



Photo 16: Photo taken 05-23-05, looking south (downstream) of station 1888+00. Photo shows a Cat 631 Scraper excavating material from the invert of new Low Flow Conveyance Channel. Groundwater is seeping into conveyance channel. Photo taken by Rudy Bernal, Bureau of Reclamation



Photo 17: Photo taken on 08-24-05, showing new Low Flow Conveyance Channel section at Station 1895+00 looking downstream. Photo shows completed riprap slope protection on the west side of new conveyance channel. Also shown is a Linkbelt 4300 Excavator performing final slope excavation on the east side of the conveyance channel. Photo taken by Rudy Bernal, Bureau of Reclamation.



Photo 18: Photo taken 12-30-05, showing Contractor placing concrete grade control structure for San Lorenzo Arroyo. Four rows of sheet piles at 6-foot drops are shown. Photo taken by Cord Everetts.

At the third priority site, River Mile 111, a levee setback has also been selected as the preferred alternative. Reclamation has completed its alternative analysis and value engineering study for this project, and is currently working on completing the project description to begin the environmental compliance process. In the area where the levee setback is planned, however, a vegetation control study is being performed to see what effects goats can have on controlling saltcedar. This study is being performed by the United States Department of Agriculture,



Agricultural Research Service (USDA-ARS) and the Middle Rio Grande Conservancy District (MRGCD). This vegetation control study will delay the start of the levee setback project until early 2008.



Photo 19: Looking downstream at RM 111 Priority Site. Symbol identifies proximity of existing levee and LFCC. (2005)

During the 2005 spring runoff considerable bank erosion (approximately 140 feet) was seen at the 111 priority site. Given the erosion potential at this site, a short term fix is desirable to protect the levee and the Low Flow Conveyance Channel (LFCC) as a safeguard against emergency work that may be needed if nothing is done. A temporary riprap windrow will be installed as a short term precaution between the levee and the river. The riprap windrow design will place 16-inch nominal riprap along 1100 feet to protect the levee in the immediate future. Final design and environmental permits were obtained in the latter part of 2005, with construction expected to be completed in the early part of 2006.

### **Arroyo de la Parida**

In April 2005, Reclamation completed construction maintenance at the Arroyo De la Parida site by removing a sediment control structure from the Low Flow conveyance outfall channel. At the site the arroyo has created and continues to create a fan into the Rio Grande. The direction of flow from the arroyo into the Rio Grande is perpendicular causing flows to move directly into the right bankline and towards the sediment control structure. Removal of the structure helped in addressing this potential river maintenance problem. This solution was carefully considered after evaluating the structure's elevation, proximity to the river and arroyo, history of use, and

intended purpose.

### **Tiffany Sediment Plug Removal**

During the 2005 spring runoff, a sediment plug formed in the Tiffany area and completely blocked the main channel of the Rio Grande. The plug first formed about 1.5 miles upstream of the San Marcial railroad bridge and eventually extended about 3 miles upstream. The plug resulted in the entire channel filling with sediment and water flowing into overbank areas. Excavation of a pilot channel through the plug (Photo 20) began in October 2005 and was completed in December 2005. The excavation was performed by a crew with personnel from both Reclamation and a contractor hired by NMISC, Wilco Marsh Buggies, Inc. River flows in the main channel have been restored by the pilot channel excavation. These flows are currently widening and deepening the channel to its pre-plug condition.



Photo 20: Pilot channel excavation at the Tiffany Sediment Plug, November 2005

### **Truth or Consequences**

To maintain the authorized 5,000 cfs capacity in the reach of the Rio Grande between Elephant Butte Dam and Caballo Reservoir, Reclamation annually excavates sediment from the river channel. Maintenance activities are conducted after releases are shut off from Elephant Butte

Dam each fall. The primary activity consists of sediment removal at arroyo mouths. Secondary activities include sediment removal in other areas throughout the reach and bank stabilization with riprap at selected sites. During periods of non-release, Reclamation installs a dike in the river to raise the stage for the benefit of hot spring bathhouse owners in Truth or Consequences. Owing to the interaction between the river and the hot spring aquifer, the increased stage within the river floodway increases water temperatures and the flow of water at hot spring sites.

Sediment excavation at arroyo mouths and temporary dike installation occurred during late 2005 (Photo 21); approximately 6,000 cubic yards of sediment were removed.



Photo 21: Removal of sediment at the Arroyo Hondo confluence near Truth or Consequences, December 2005

### **2005 Spring Runoff Critical Repairs**

In 2005, an above normal (~130%) spring runoff occurred on the Rio Grande through the Middle Rio Grande valley between Velarde, New Mexico and the headwaters of Elephant Butte reservoir. Reclamation performed heightened monitoring and ground inspections and additional critical maintenance repairs in response to the above normal spring runoff. At some locations Reclamation performed emergency and pre-emergency maintenance repair work.

During the spring runoff flows, inspections by Reclamation determined that the riverside berm

between Drain Unit 7 and the Rio Grande was in danger of failure. At this site Reclamation performed a short term fix by placing approximately 900 CY of riprap armoring along 240 feet of bank (see Photo 22).



Photo 22: Drain Unit 7 immediately upstream of San Acacia Diversion Dam, arrow identifies location requiring riprap protection during spring runoff high flows (2005)

Downstream of this location at the South Boundary of the Bosque Del Apache Pump Site high flows on the Rio Grande caused water to flow between the carrier and casing pipes through the levee and exiting on the LFCC side. This caused significant erosion of material on the west side of the levee. Earth and rock material (approximately 400 CY) was placed on the river side of the levee to cut off seepage flows between the carrier and casing pipes. For added protection, concrete was also placed on the west side of the levee, plugging the void between the carrier and casing pipes. At a late date during the runoff similar work was necessary at the North Boundary Bosque Del Apache Pump site.

During the spring runoff high flows, longitudinal cracking of the levee occurred on Tiffany Levee about 1-2 miles upstream of the San Marcial railroad bridge. Also, during the spring runoff the Tiffany Sediment Plug caused elevated river stages along the levee to the point where the levee was less than 1-3 inches from being overtopped. Reclamation performed repairs on the Tiffany levee consisting of placement of embankment fill material on top of the levee and both sided slopes, this strengthened the levee and reduced seepage.



Photo 23: Tiffany Levee looking downstream at top of levee during spring runoff high flows with sediment plug in the river channel. Note that levee has no freeboard and is close to overtopping. (2005)



Photo 24: Tiffany Levee showing completed placement of embankment material on the riverside of the Tiffany Levee (2005)

Downstream of the San Marcial railroad bridge breaches occurred along the interior berm access road (Photo 25). Immediately after the spring runoff, Reclamation repaired the portions of the berm access road that were damaged.



Photo 25: San Marcial Railroad Bridge crossing during spring runoff looking downstream. Arrow denotes breaches that occurred along the interior berm. (2005)

During the spring runoff high flows, various piping and seepage problems occurred along the San Marcial levee. Specific locations include near Elephant Butte Rangeline 12 just downstream of the San Marcial railroad crossing and near the Ft. Bridge crossing on the LFCC. During the high flows at the EB 12 site, Reclamation implemented fixes involving excavation of small drainage ditches along the levee toe and the placement of culvert pipe to help drain the seepage into the LFCC. Also, at the Ft. Craig site Reclamation placed fill material in compacted lifts on the river side of the levee for repairs related to piping and seepage problems.



Photo 26: San Marcial Levee looking upstream near EB 12 showing accumulated seepage through the levee, LFCC on left and river behind levee on right (2005)



Photo 27: San Marcial Levee near Ft. Craig showing void created by piping through the levee (2005)



Photo 28: San Marcial Levee near Ft. Craig showing completed repair work (2005)

### **2005 Post-Runoff Field Review**

Reclamation conducted a field review in July 2005 to assess the post runoff channel conditions following the above normal runoff. A team comprised of individuals from the Albuquerque Area Office Technical Services Division and Reclamation's Denver Technical Center's Sedimentation and River Hydraulics group conducted the review. A report summarizing the finding of the review was finalized in December 2005. The report summarizes the changes in conditions at existing priority and monitored sites. The report also identified approximately 6-7 new sites where the spring runoff high flow conditions have created new river maintenance needs.





Photo 29: Post Runoff review at the Corrales Siphon location looking upstream on west bank showing bank erosion underneath large cottonwood tree (July 2005)



Photo 30: Post Runoff review at the Ft. Craig pump site location looking at west bank showing bank erosion and increased bank height from channel degradation (July 2005)

### **Middle Rio Grande River Maintenance Plan**

The Middle Rio Grande River Maintenance program is undertaking an effort to develop a long term River Maintenance Plan that will assist in accomplishing project purposes in an environmentally and economically sound manner that is consistent with Project authorization. The plan is a technical plan and includes objectives to help answer questions such as: 1) What should Reclamation's role be for river maintenance?; 2) Are the current river maintenance actions the most effective and best actions?; 3) Should other actions that differ from the current strategies be taken?; and 4) How does the long-term plan for river maintenance fit into the long-term plan for ecosystem recovery and Endangered Species Act needs?.

The maintenance plan's main objective is to provide a technical guide for Reclamation's future river maintenance activities, to meet the original project authorization (core mission) purposes and environmental compliance needs. The first phase of the plan is currently underway. The first phase will provide documentation of the authority and necessary maintenance actions, including legal requirements, water delivery issues, endangered species issues, current river and LFCC conditions, historical changes in these conditions, and potential river and LFCC realignment strategies downstream of the San Marcial railroad bridge. The second phase will provide

strategies to address issues identified in the first to provide potentially more effective river maintenance strategies and develop improved river maintenance options.

The combined two phase of the maintenance plan are envisioned to be an engineering and geomorphic review that can be used to readily implement the most cost effective and environmentally sound strategies that reduce Reclamation's long term commitment of resources.

## **Rio Grande River Restoration Projects**

### **I-40 Rio Grande Silvery Minnow Habitat Restoration Project**

Reclamation completed a demonstration silvery minnow nursery habitat project on a pointbar immediately south of the I-40 bridge. The project constructed shelves, inlets, side channels and berms to increase habitat complexity over a wide range of spring flows during the silvery minnow spawning season. The goal is to provide nursery habitat for increasing recruitment (Porter and Massong 2006) and demonstrate designs for effective habitat restoration.

### **Los Lunas Habitat Restoration Project**

The Los Lunas Habitat Restoration Project is a joint project between the Corps, Reclamation, and MRGCD funded through the Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program). Habitat restoration at the Los Lunas project site was intended to improve habitat for the Rio Grande silvery minnow and the southwestern willow flycatcher.

Major construction was completed by December 2002. Biological monitoring, cross section surveys, and re-vegetation continued in 2005. Nutrient and larval monitoring in 2005 found that areas with near zero velocity provided the most productive spawning and nursery habitat. There has been mixed success with revegetation efforts due to 50-plus days of continuous inundation in May through July of 2005.

## **Rio Grande and Low Flow Conveyance Channel (LFCC) Modifications and EIS**

Reclamation released a Draft EIS on proposed realignment of the Rio Grande and the LFCC below San Marcial in September, 2000. The proposed project would alleviate some of the more critical channel maintenance problems in the San Marcial area. The Draft EIS evaluates alternatives for reconfiguring the channel system below San Marcial for continuing water conservation benefits, maintaining system elements for effective valley drainage, and minimizing costs while considering environmental needs and the protection of endangered species and their habitats. The Draft EIS did not address operation of the LFCC.

In May 2001, Reclamation submitted a Biological Assessment to USFWS requesting formal Section 7 consultation on the proposed project. At a meeting on June 30, 2003, the USFWS informed Reclamation and NMISC that they could not complete consultation on the channel realignment unless operations of the LFCC were addressed.

Some preliminary data collection work on the proposed channel realignment is continuing. A proposed new alignment for the LFCC is currently being surveyed. This work is partially funded by the Middle Rio Grande Endangered Species Act Collaborative Program.

Reclamation and the Corps have had discussions relating to coordination of the realignment project and the proposed replacement of the San Marcial railway bridge. Increased flexibility for routing future river alignments would result from locating the bridge to cross a new river channel more centrally in the floodplain, rather than cross the existing channel on the extreme eastern edge. It now appears that because of lack of funding and scheduling issues for the realignment project, the COE will construct the bridge and realign a segment of the LFCC in the area of the bridge separately. The COE is developing a bridge design that would accommodate a possible future channel realignment.

## Endangered Species

### Rio Grande Silvery Minnow

The silvery minnow was formerly one of the most widespread and abundant species in the Rio Grande basin of New Mexico, Texas, and Mexico, but is now endangered (Fish and Wildlife Service, 1994). Currently, the silvery minnow occupies less than 10 percent of its historic range and is restricted to the reach of the Rio Grande in central New Mexico from Cochiti Dam to the headwaters of Elephant Butte Reservoir.

Reclamation remains in compliance with the 2003 BiOp. During the 2005 irrigation season, flow in the Albuquerque reach from Cochiti to Isleta Diversion Dam was maintained through the year due to above average runoff. The Rio Grande was allowed to dry in isolated locations below Isleta Diversion Dam, and from San Acacia Diversion Dam downstream to the south boundary of Bosque del Apache National Wildlife Refuge (refuge). Water pumped from the LFCC maintained flow in the river channel south of the refuge. Native flow reconnected the river following the end of irrigation season, and all LFCC pumping ceased on November 1, 2005, for the year.

Silvery minnow populations increased significantly in 2005 throughout their current range as indicated by the total number of fish recorded in the benchmark October monitoring (Figure 5). The numbers of silvery minnow eggs observed during extended monitoring efforts remained extremely low (Figure 6). The increase is attributed to the extended high flows (70 days above 3,000 cfs at Albuquerque) shown in Figure 7. Extensive inundation of pointbars, islands, and floodplain increased useable nursery habitat which improved recruitment.

Reclamation completed studies on egg retention in nursery habitat. Figure 8 displays silvery minnow abundance within various reaches of the Rio Grande based on surveys conducted from 2001 through 2005. The 2001 surveys were conducted bimonthly, with monthly surveys in 2002-2005. Although the population increased in all reaches in 2005, intermittency appears to have continuing adverse effects on downstream silvery minnow populations, based on lower numbers of minnows in the intermittent areas. Continuation of increased recruitment appears dependent on sufficient flows during spawning, and augmentation throughout reaches with stable summer

flows.

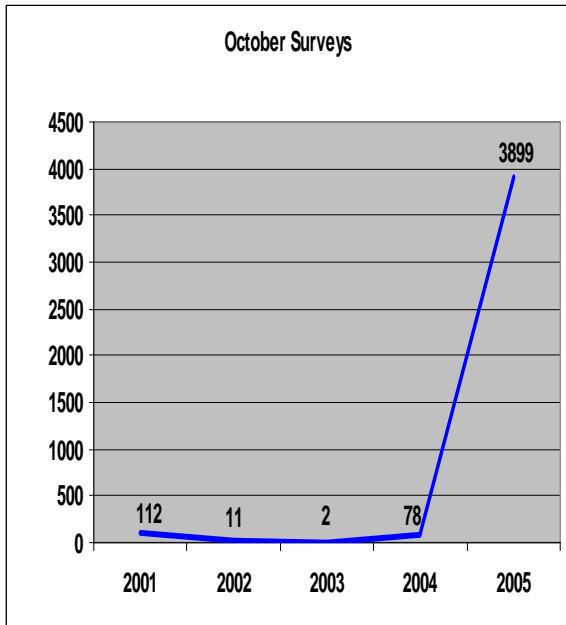


Figure 5: October 2005 Surveyed Populations

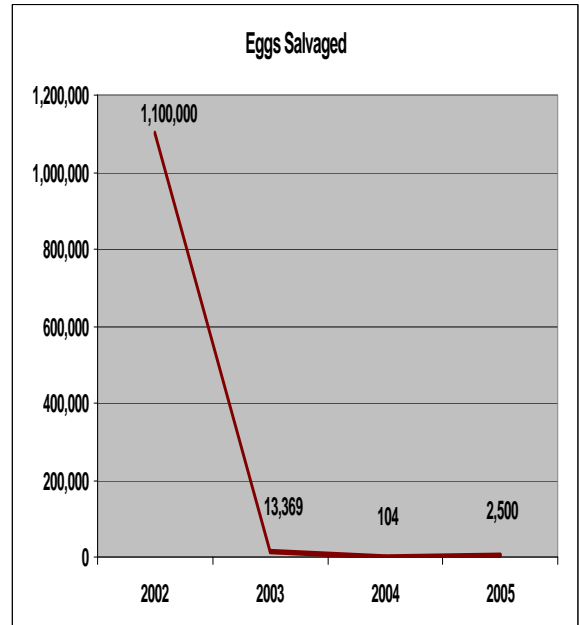


Figure 6: Observed Eggs during Salvage

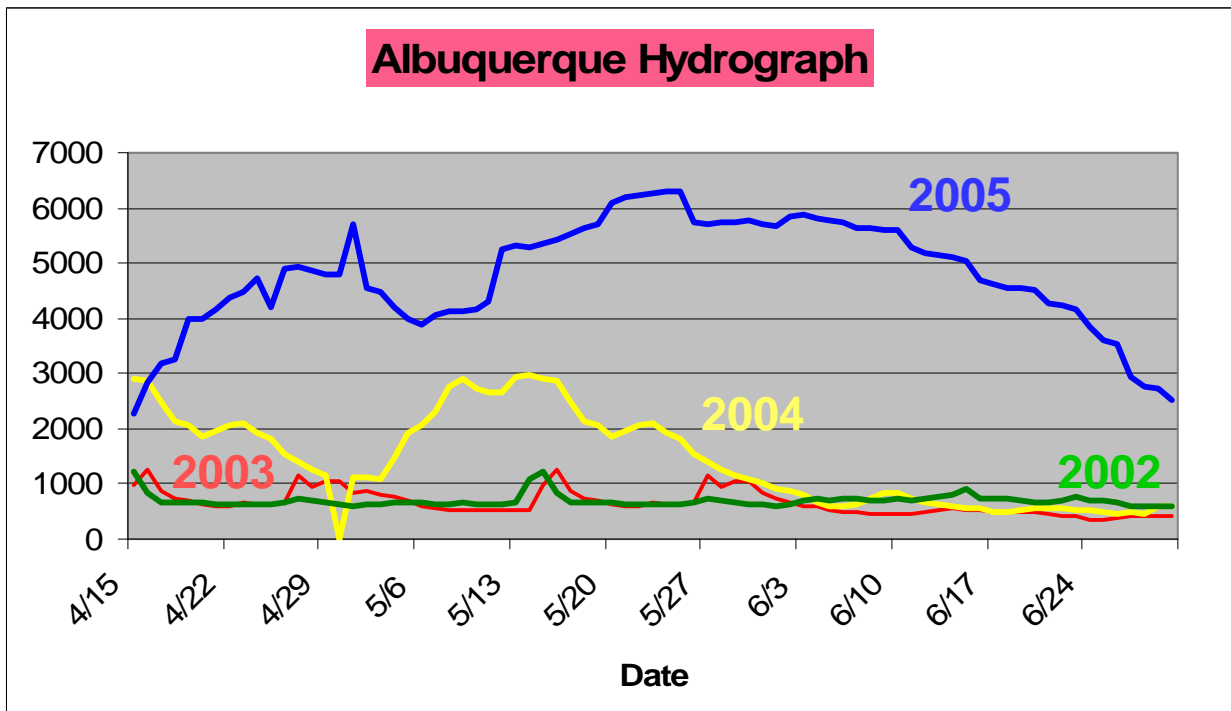


Figure 7: Albuquerque Hydrograph Comparison

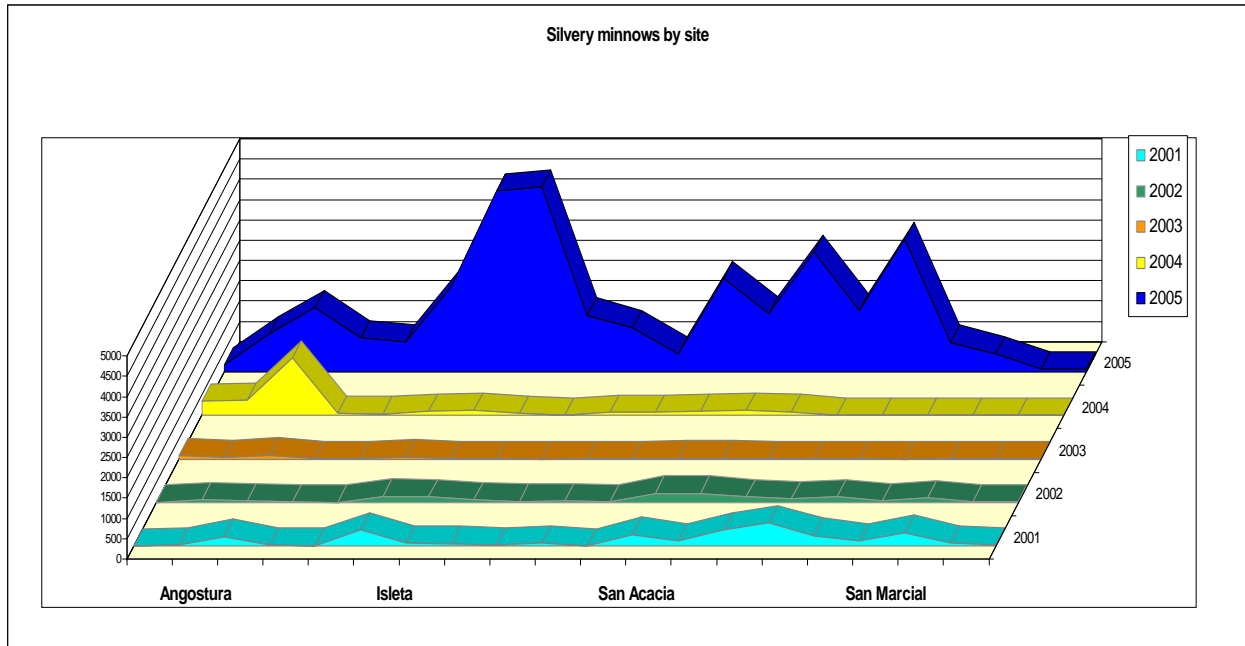


Figure 8: Rio Grande Silvery Minnow Abundance

The Rio Grande Silvery Minnow Recovery Team submitted a draft revised recovery plan to the Fish and Wildlife Service for review in September 2005. Captive silvery minnow populations include Albuquerque Biopark, Dexter National Fish Hatchery, and New Mexico State University. The Service has initiated the process for re-introduction of the silvery minnow into Big Bend National Park, Texas. A sustainable population outside the Middle Rio Grande is essential for downlisting the species to threatened status.

### Southwestern Willow Flycatcher

The Southwestern Willow Flycatcher was listed endangered by the USFWS effective March 29, 1995. Critical habitat was designated, effective August 21, 1997 in some areas of New Mexico and other states throughout the species' range. The Rio Grande was not designated as critical habitat for the Southwestern Willow Flycatcher at that time and the 1997 critical habitat proposal was later retracted. On October 13, 2004, under court order, the USFWS reissued a proposed designation for critical habitat for the Southwestern Willow Flycatcher that now includes portions of the Rio Grande in New Mexico. The final rule designating critical habitat was issued October 19, 2005 and includes four sections of riparian forest in the Middle Rio Grande valley: from the Taos Junction bridge to the north boundary of San Juan Pueblo, from the south boundary of the Pueblo of Isleta to the north boundary of Sevilleta National Wildlife Refuge (NWR), from the south boundary of Sevilleta NWR to the north boundary of Bosque del Apache NWR, and from the south boundary of Bosque del Apache NWR to the powerline crossing of the Rio Grande near Milligan Gulch. Though critical habitat is not proposed for every location where Southwestern Willow Flycatchers exist on the Rio Grande, Section 7 of the ESA requires all Federal agencies to consult with the USFWS on any action that "may affect" a listed species, regardless of whether critical habitat has been designated or not. Reclamation has been in consultation with the USFWS pursuant to Section 7 over numerous actions, mainly operations and maintenance activities along the Rio Grande, since 1995.

Six primary breeding sites for Southwestern Willow Flycatchers have been documented during various survey efforts in the Middle Rio Grande between 1993 and 2005 and include the following: San Juan Pueblo, Isleta Pueblo, Sevilleta NWR and La Joya State Wildlife Management Area (WMA), the San Marcial area, and the Elephant Butte Reservoir delta. Table 9 displays the results of surveys for Southwestern Willow Flycatchers at these and other sites from 2000 through 2005.

Reclamation continues to conduct Southwestern Willow Flycatcher surveys and nest monitoring along portions of the Middle Rio Grande. Between 2000 and 2005, the number of Southwestern Willow Flycatcher territories in the San Marcial reach has expanded from 23 to a maximum of 113. A majority of these territories are located in the newly-developed riparian vegetation within the uppermost levels of the conservation pool of Elephant Butte Reservoir. This area holds the largest breeding population of Southwestern Willow Flycatchers on the Middle Rio Grande to date. Flycatcher surveys and nest monitoring in selected areas of the Middle Rio Grande will continue in 2006.

Table 9: Estimate of Southwestern Willow Flycatcher Territories – Middle Rio Grande Project, 2000 - 2005 Breeding Seasons

River Reach	Number of Territories 2000	Number of Territories 2001	Number of Territories 2002	Number of Territories 2003	Number of Territories 2004	Number of Territories 2005**
Velarde	2	1	0	not surveyed	1	0
San Juan Pueblo	16	not surveyed	not surveyed	unknown	unknown*	unknown*
Isleta Pueblo	14	not surveyed	not surveyed	5	unknown	unknown
Belen reach	not surveyed	not surveyed	not surveyed	not surveyed	0	1
Sevilleta NWR/La Joya State WMA	8	11	13	17	19	20
Bosque del Apache NWR	1	2	4	3	1	0
San Marcial/Tiffany areas	4	3	12	34	16	3
Elephant Butte Reservoir Delta	19	22	51	52	113	107
Total	63	39	80	111	149	131

(Ahlers et al. 2000, 2001, 2002, Moore and Ahlers 2004, 2005; Smith and Johnson 2004; Taylor 2000, 2001, 2002; Williams 2000)

\* Surveyed by New Mexico Dept. of Game & Fish; results currently not available.

\*\* USBR unpublished data

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Moore, D. and D. Ahlers 2004. 2003 Southwestern Willow Flycatcher study results: selected sites along the Rio Grande from highway 60 to Elephant Butte Reservoir. U.S. Department of the Interior, Bureau of Reclamation, Technical Services Center, Denver, CO.

Moore, D. and D. Ahlers 2005. 2004 Southwestern Willow Flycatcher study results: selected sites along the Rio Grande from Velarde to Elephant Butte Reservoir, New Mexico. U.S. Department of the Interior, Bureau of Reclamation, Technical Services Center, Denver, CO.

## **Middle Rio Grande Endangered Species Act Collaborative Program**

The Middle Rio Grande Endangered Species Act Collaborative Program (Collaborative Program) is a collaborative effort by Reclamation and other Federal and non-Federal partners to preserve, protect, and improve the status of endangered species while also protecting existing water uses and ensuring compliance with all applicable laws. The Interim Steering Committee was formed to achieve the required work to establish the long-term Program including: a long-term Cooperative Agreement, Program document, draft authorizing legislation, compliance with environmental regulations, identification of a long-term water supply, and fulfillment of federal trust responsibilities. There are 22 Memorandum of Understanding signatories including Reclamation, USFWS, the Corps, U.S. Forest Service, Bureau of Indian Affairs, multiple agency representatives of the State of New Mexico, MRGCD, Alliance for Rio Grande Heritage, Rio Grande Restoration, City of Albuquerque, Albuquerque Bernalillo County Water Utility Authority, National Association of Industrial and Office Properties, University of New Mexico, Pueblo of Isleta, Pueblo of Sandia, Santo Domingo Tribe and two additional agriculture and irrigation interests.

Congress provided the Collaborative Program, through Reclamation, approximately \$6.15 million in FY 2005 and \$12.6 million in FY 2006. The Collaborative Program activities consist of short and long term efforts to benefit the listed species, including habitat restoration, endangered species monitoring, Rio Grande silvery minnow propagation and rescue, water acquisition and management, supportive of ESA Section 7 consultation requirements and recovery plans of the listed species. Activities selected to receive funding in FY 2005 are ongoing. Proposals submitted under the FY 2006 Request for Proposals process are pending completion of the review process. Program accomplishments in 2005 include continuation of work on the programmatic NEPA, conducting government-to-government consultations, developing streamlined processes for awarding funding and reviewing project deliverables, drafting a Memorandum of Agreement and by-laws for the Program utilizing draft authorizing legislation as guidance, and working with the Corps to facilitate a smooth transition of administrative functions for the Collaborative Program to the Corps. Major accomplishments for 2005 include continued Biological Opinion compliance and a significant increase in the Rio Grande silvery minnow population that was supported by Collaborative Program activities.



## **Programmatic Water Operations and River Maintenance ESA, Section 7, Consultation**

During the *Minnow v. Keys* litigation, the District Court ordered Reclamation to reinstate ESA consultation for 2003 water operations. This consultation was initiated by Reclamation in October 2002. On March 17, 2003, USFWS issued the 2003 BiOp on the effects of actions associated with the “Programmatic Biological Assessment of Bureau of Reclamation’s Water and River Maintenance Operations, Army Corps of Engineers’ Flood Control Operation, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico.” In the 2003 BiOp, USFWS analyzed the full spectrum of water management options described in the February 19, 2003, final biological assessment for March 10, 2003, through February 28, 2013, water operations and river maintenance proposed by Reclamation and the Corps.

The USFWS issued the 2003 BiOp with a Reasonable and Prudent Alternative (RPA) designed to alleviate jeopardy to the Rio Grande silvery minnow, adverse modification to Rio Grande silvery minnow critical habitat, and jeopardy to the southwestern willow flycatcher based on the biological needs of the species. The RPA elements address some of the long-term recovery needs of the Rio Grande silvery minnow by incorporating four essential factors during the 10-year scope of the project: (1) water operations; (2) habitat improvement; (3) population management; and, (4) water quality. The water operations elements establish minimum water flows under different hydrologic scenarios that are needed to alleviate jeopardy to both species.

In August 2005, Reclamation and the U.S. Army Corps of Engineers (Corps) reinstated consultation with the U.S. Fish and Wildlife Service (Service) seeking an amendment to the incidental take statement (ITS). The amended ITS reflects the effects that spring hydrologic conditions and silvery minnow population status have on the numbers of minnows that may be found in the river during low flow periods. The ITS is calculated using fall recruitment, spring flow, and the amount of augmentation. The level of allowable incidental take was increased from an observed mortality of 760 to 10,440 individuals. The incidental take on November 1, 2005, was 5,640.

In October 2005, Reclamation and the Corps requested reinstatement to address responsibilities related to the formal designation of critical habitat for the Southwestern willow flycatcher. Currently, Reclamation and the Corps are preparing an amendment to the Programmatic Biological Assessment.

### **Rio Grande Silvery Minnow v. Keys Litigation**

In November 1999, environmental groups collectively filed suit against Reclamation and the Corps for alleged Endangered Species Act (ESA) and National Environmental Policy Act (NEPA) violations. The Middle Rio Grande Conservancy District (MRGCD), State of New Mexico, City of Albuquerque, and Rio Chama Acequia Association subsequently intervened. The plaintiffs identified the central issue to be the scope of discretionary authority that Reclamation and the Corps have over the Middle Rio Grande and San Juan-Chama Projects’ water deliveries and river operations.

The District Court of New Mexico (District Court) issued a final judgment and memorandum opinion in this case on November 22, 2005, and dismissed portions of the case. Judge Parker denied all motions to vacate his 2002 rulings regarding Reclamation's discretion over water operations. The judge ruled that in future consultations under the ESA, Reclamation must consult with the U.S. Fish and Wildlife Service over the full scope of Reclamation's discretion concerning Middle Rio Grande Project operations. The San Juan-Chama Project water-related claims were dismissed as moot with prejudice. Judge Parker's reasoning included the fact that the December 2004 "minnow rider" enacted by Congress removed Reclamation's discretion to use San Juan-Chama Project water to meet ESA requirements. Federal defendants, the State of New Mexico, and MRGCD have appealed Judge Parker's November rulings to the 10th Circuit Court of Appeals.

In MRGCD's cross-claim against the United States in the *Minnow v. Keys* lawsuit, MRGCD seeks to quiet title to certain Middle Rio Grande Project properties. The United States' position in this cross-claim is that MRGCD conveyed these Middle Rio Grande Project properties to the United States and that these properties remain in the name of the United States until, among other things, Congress authorizes title transfer. The repayment contract also stays in effect until such time.

Judge Parker ruled in favor of the United States on July 25, 2005. Ownership of all properties necessary for MRG project operations, including El Vado Dam and San Acacia and Angostura diversion dams, was declared to be in the United States. In September 2005, MRGCD and the City of Albuquerque appealed Judge Parker's decision in the quiet title cross-claim.

### **Temporary Pumping Program – San Acacia to Fort Craig Reach**

During the irrigation season, flows in the Rio Grande between San Acacia Diversion Dam and the headwaters of Elephant Butte Reservoir can drop to a level that may potentially result in adverse impacts to the Rio Grande silvery minnow and southwestern willow flycatcher. Reasonable and Prudent Alternatives D, G, K, and O of the 2003 BiOp require the use of pumps to manage river recession, maintain river connectivity, and supply water for nesting southwestern willow flycatchers. The Temporary Pumping Program also helps Reclamation comply with the continuous river requirements stipulated by Reasonable and Prudent Alternatives E, H, and L.

In an effort to help maintain a minimum flow within this reach of the Rio Grande and comply with the Reasonable and Prudent Alternatives of the 2003 BiOp as well as prior biological opinions, Reclamation has installed portable pumps with flow measurement devices at strategic locations to move water from the LFCC into the Rio Grande floodway. Discharge data for the pumping sites is now posted in orange boxes on the Reclamation ET Toolbox web site within the MRGCD / Rio Grande Silvery Minnow Operations schematic pages. The URL of the referenced site is:

[www.usbr.gov/pmts/rivers/awards/Nm/rg/RioG/gage/schematic/SCHEMATICsouth.html](http://www.usbr.gov/pmts/rivers/awards/Nm/rg/RioG/gage/schematic/SCHEMATICsouth.html)

The portable pumps were effectively used to augment river flows during the 2005 irrigation season, allowing Reclamation to maximize the effectiveness of supplemental water releases made for ESA purposes.

The total available pumping capacity for all pump locations is now approximately 200 cfs, although the maximum total combined rate is limited to 150 cfs by the permit from 2003 granted by the New Mexico State Engineer. A total of approximately 4,600 af was transferred from the LFCC to the Rio Grande floodway through the Temporary Pumping Program during 2005. Additional information on the Temporary Pumping Program can be found in the Reclamation report entitled “*2005 Supplemental Water Program Report*”.

# RIO GRANDE PROJECT (NEW MEXICO - TEXAS)

Reclamation's El Paso and Elephant Butte Field Divisions are jointly responsible for the operations of the Rio Grande Project (Figure 9). Elephant Butte Field Division operates and maintains Elephant Butte and Caballo Dams. El Paso Field Division is responsible for scheduling releases from Elephant Butte and Caballo Reservoirs to meet irrigation demand and the delivery of Rio Grande Project water to the canal headings of Elephant Butte Irrigation District (EBID), El Paso County Water Improvement District No. 1 (EPCWID), and Mexico (under the 1906 International Treaty). EBID operates and maintains Reclamation's diversion dams on the Rio Grande, including Percha Diversion Dam, Leasburg Diversion Dam, and Mesilla Diversion Dam in New Mexico. EBID operates and maintains the three diversion dams in New Mexico under a contract with Reclamation. In September 2003, Reclamation completed work to remove Riverside Diversion Dam and the adjacent Coffey Dam, both in Texas. Riverside Diversion Dam had been inoperable since 1987, when flooding on the Rio Grande caused the structure to fail.

## Water Supply Conditions

Inflow into Elephant Butte Reservoir during 2005 as measured at the Rio Grande Floodway (FW) plus the LFCC at San Marcial (FW+LFCC) was 969,125 af which is 112.4% of the 94-year average annual flow at the San Marcial stations (FW+LFCC). The 94-year average annual flow at San Marcial (FW+LFCC) is 862,464 af. The actual 2005 March through July runoff, measured at San Marcial (FW+LFCC), was 738,095 af, which was 128.8% of the 30-year average of 573,000 af. Of the period 1996-2005, the spring runoffs (March-July) at the San Marcial gauging stations have consistently been below average, with the exception of 1997 and 2005, which were 120% and 129% of average respectively. The 1996, 2000, 2002, and 2003 spring runoffs have been near-record low volumes, with the 2003 spring runoff volume being the ninth lowest on record at the San Marcial gauging stations. During 2005, 717,450 af of water was released from Elephant Butte Reservoir. There was a release of 676,030 af to meet the irrigation requirements of Project water users from Caballo Reservoir.

The January through June Natural Resources Conservation Service and National Weather Service (NRCS & NWS) coordinated forecasts received for the 2005 March through July runoff season are presented in Table 10.

Combined total storage for Elephant Butte and Caballo Reservoirs was 444,312 af on December 31, 2005. This combined storage was 18.9% of the total capacity of both reservoirs, and 20.0% of the available storage. The available storage for both reservoirs during the winter months (October 1 to March 31) is equal to the capacity of Elephant Butte Reservoir, 2,023,358 af minus 25,000 af that Reclamation reserves for winter operational flood control space (50,000 af during the summer), plus the capacity of Caballo Reservoir, 326,672 af minus 100,000 af for flood control space, or 2,225,030 af during the winter (2,200,030 af during the summer).

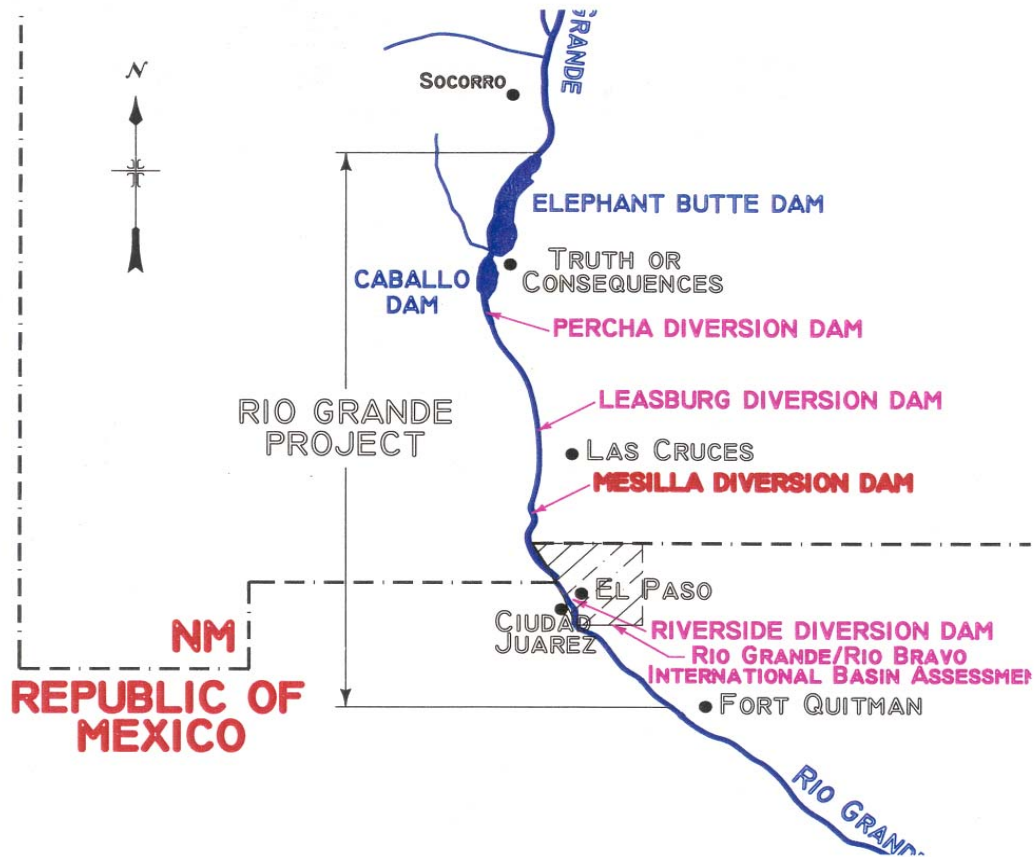


Figure 9: Area Map of the Rio Grande Project

Per the Rio Grande Compact Article I definition, the usable water in Project storage (Elephant Butte and Caballo Reservoirs together) was below 400,000 af until May 20, 2005. Article VII of the Rio Grande Compact stipulates that when usable water in Project storage is below 400,000 af that no “native Rio Grande flows” will be stored in post-1929 reservoirs upstream of Elephant Butte Reservoir in New Mexico and Colorado, unless relinquishment of credit waters in Elephant Butte Reservoir occurs. On March 31, 2005, Colorado relinquished 2,062 af of its credit waters to Texas, and Texas accepted the relinquishment. The 2,062 af of relinquished credit waters was then allocated to the Rio Grande Project water users for the 2005 irrigation season. From May 20, 2005 to August 26, 2005, usable water in Project storage was above 400,000 AF. From August 26, 2005 to December 27, 2005, usable water in Project storage was below 400,000 af; however, on December 27, 2005, usable water in Project storage went above 400,000 af.

Table 10: Summary of 2005 Rio Grande Coordinated Spring Runoff Forecasts

Month	Forecasted Otowi Runoff (af)	Percent of 30-Year Average	Forecasted San Marcial Runoff (af)	Percent of 30-Year Average
Jan 1	650,000	86	400,000	70
Feb 1	960,000	127	675,000	118
Mar 1	1,060,000	140	760,000	133
Mar 15	1,015,000	134	750,000	131
Apr 1	1,150,000	152	930,000	162
May 1	1,200,000	159	950,000	166
June 1	1,150,000	152	935,000	163
Actual Runoff	943,705	125	738,095	129

A final allotment to the Rio Grande Project water users of 100% of a full supply was declared by Reclamation on September 12, 2005 for the 2005 irrigation season. The initial allotment to the Rio Grande Project water users (declared on December 17, 2004) started at only 14.87% of a full supply. After two years in a row (2003 and 2004) of less than full supplies for the Rio Grande Project, 2005 benefited all Project water users with a full supply for irrigation.

For the 2006 irrigation season, a less than full allotment (only 37.73% of a full supply) was declared on December 16, 2005. This initial allotment was revised on January 18, 2006, but still remains less than a full allotment (42.54% of a full supply) based on inflow to the Rio Grande Project reservoirs and existing storage during November and December 2005. Based on the January 1 NRCS/NWS spring runoff forecast at the San Marcial gauging stations and present hydrologic conditions, Reclamation anticipates a less than full supply for irrigation during 2006 for the Rio Grande Project.

The 2006 coordinated forecasts from the NRCS & NWS for the 2006 March through July runoff season is presented in Table 11.

Table 11: 2006 Rio Grande Coordinated Spring Runoff Forecasts

Month	Otowi Runoff (af) (Mar-Jul)	Percent of 30-Year Average	San Marcial Runoff (af) (Mar-Jul)	Percent of 30-Year Average
Jan 1	415,000	55	255,000	45
Feb 1	300,000	40	145,000	25
Mar 1	200,000	26	57,000	10

## **Project Irrigation and Drainage Systems and Title Transfer**

In 1992, Congress authorized the transfer of title to certain irrigation facilities to the Districts. The official transfer of the irrigation and drainage rights-of-way and facilities to the Districts was completed on January 22, 1996. In 2005, the irrigation and drainage system continued to be owned, operated, and maintained by Elephant Butte Irrigation District in the New Mexico portion of the Rio Grande Project and by El Paso County Water Improvement District No. 1 in the Texas portion of the Project. Reclamation continues to own and administer the lands and rights-of-way activities of the reservoirs and diversion dam areas.

Reclamation retains title and operation and maintenance responsibilities for Elephant Butte and Caballo Dams and Reservoirs. Operation and maintenance of the diversion dams are performed by the Districts under contracts with Reclamation. Reclamation retains the rights-of-way and title of the diversion dams and their associated reserved works. The Districts performed flow measurements at canal headings, river stations, and lateral headings during 2005. Reclamation coordinated and maintained central control of releases, river operations, and water accounting. To accomplish the water allotment accounting, the Districts collected field flow measurements and coordinated data from all water user entities. Utilizing the summarized flow data submitted by the Districts for their areas of responsibility, Reclamation calculated and summarized the monthly and end-of-year Project water supply use and accounting for 2005. The International Boundary and Water Commission (IBWC) continued to own, operate, and maintain the American Diversion Dam and the American Canal during 2005 in accordance with the International Treaties with Mexico (1906 and 1933). In addition, the IBWC operated the International Diversion Dam which diverts irrigation waters into the Acequia Madre headgates operated by Mexico.

Drainage waters from the Rio Grande Project lands provide a supplemental irrigation water supply for approximately 18,342 acres of the Hudspeth County Conservation and Reclamation District No. 1 (HCCRD). Total flows out of the Project to HCCRD, through the Hudspeth Feeder Canal, Tornillo Canal at Alamo Alto, and Tornillo Drain were 75,100 af during 2005. Under the Warren Act contracts, HCCRD was charged for drainage water from the Project between March 1 and September 30 which amounted to 68,360 af.

Water flows measured by IBWC on the Rio Grande at Fort Quitman Station, downstream of the Project and HCCRD boundaries, amounted to 110,959 af during 2005.

## **Elephant Butte Reservoir and Powerplant**

Elephant Butte Reservoir reached a maximum storage of 560,919 af (elevation 4,344.20 ft) on June 25, 2005. A minimum storage of 194,426 af (elevation 4,309.94 ft) was reached on January 01, 2005. Storage levels in Elephant Butte Reservoir did not enter into the 50,000 af prudent flood control space in 2005.

Net power generation for 2005 was 49,634,650 kilowatt-hours which was 66.7 percent of the 66-year average (1940 through 2005) of 74,427,213 kilowatt-hours.

The power plant releases were utilized to meet downstream irrigation demand and manage Caballo Reservoir storage levels. The balance valves were utilized to help meet peak releases during 2005 (May 20-31, June 10-August 12, and September 10-16). In 1998, Reclamation determined that the hydraulic turbines of the power plant needed to be replaced because of severe stress fracturing. A new hydraulic turbine was installed in the power plant in the winter of 2001 to replace the No. 2 turbine. Another new hydraulic turbine was installed to replace the No. 3 turbine in June 2003. The last remaining turbine (No. 1 turbine) was completely replaced by early 2005.

On August 22, 2005, a heavy rainstorm near Elephant Butte Dam flooded the power plant. Extensive damage to one of the generators forced the shut down of that unit. Repair work continues, and Reclamation anticipates the start up of that unit by early summer 2006. Also, Reclamation continues repair work on the power plant's lower No. 1 penstock guard gate. Therefore, Reclamation will begin the 2006 irrigation season with two turbines available for generation and releases, and by early summer may have all three turbines available for operation. It is somewhat likely that by the end of the irrigation season (late September to October, 2006) that only two turbines will be available due to Elephant Butte Reservoir's anticipated lower head and the No. 1 lower penstock guard gate being inoperable.

## **Elephant Butte Dam Facility Review and Safety of Dams Programs**

During 2005 the following activities were completed for Elephant Butte Dam:

- The Comprehensive Facility Review was completed in 2005
- Work on Sluice gates and gate housing re-coating is still in progress
- Pitting holes were discovered in the Upper Penstock Gate of #1. They were determined to be caused by either cavitation, or from the initial casting. Verification will be done when gate is pulled.
- Completed CFR exam
- Flooding occurred late summer causing extensive damage to generators and cleaning to the control building

## **Caballo Dam and Reservoir**

Caballo Reservoir reached a maximum storage of 51,390 af (4,146.46 ft) on June 02, 2005. A minimum storage of 10,744 af (4,131.26 ft) was reached on October 13, 2005.

According to Court Order No. CIV-90-95 HB/WWD of October 17, 1996, which resulted from a negotiated settlement with the Districts, the Caballo Reservoir storage level is targeted not to exceed 50,000 af (4,146.11 ft) from October 1 to January 31 of each year, unless flood control operations, storage of water for conservation purposes, re-regulation of releases from Elephant Butte Dam, safety of dams purposes, emergency operations, or any other purpose authorized by Federal law, except non-emergency power generation, dictate otherwise. Significant variation above 50,000 af during the winter months of October through January requires collaboration and consultation between the Districts and Reclamation.



Reclamation's plan for operation of Caballo Reservoir during February 1 through September 30, 2005 was to maintain storage levels such that they would not exceed 50,000 af in February, not exceed 55,000 af in June, and not be less than 10,000 af by the end of September. Operating Caballo Reservoir at these storage levels during the 2005 irrigation season allowed Reclamation to:

- Reduce evaporative losses between Elephant Butte and Caballo Reservoirs
- Provide sufficient operational hydraulic head at Caballo Reservoir for irrigation demand releases
- Serve as a reserve pool in case releases were interrupted from Elephant Butte Dam and minimize changes to release rates from Elephant Butte Dam
- Compensate for loss in discharge capacity from Elephant Butte Dam power plant due to the turbine runner replacement program.

Caballo Reservoir's operating plan for October 1, 2005 through September 30, 2006 has not been finalized yet. Due to current drought conditions and uncertainty of the 2006 spring runoff volume into Elephant Butte Reservoir, Reclamation will finalize its operating plan in the spring of 2006. The plan will reflect accommodations for the minimization of evaporation differences between Elephant Butte and Caballo Reservoirs, and maintenance of some reserve water in Caballo Reservoir for emergency purposes.

## **Caballo Dam Facility Review and Safety of Dams Programs**

During 2005 the following activities were completed for Caballo Dam:

- The update for the Standard Operating Procedures (SOP) and the Emergency Action Plan (EAP) is in progress and is scheduled for completion by December 31, 2005
- CFR was completed in 2005
- Security Plan was completed in 2005

## **Data Automation and Instrumentation and Flow Monitoring System**

Reclamation's El Paso Field Division continued to maintain its Internet Web Page for the Rio Grande Project during 2005. The current year's daily, weekly, and monthly data of the operations of Elephant Butte & Caballo Reservoirs, and the delivery of water to the two United States Rio Grande Project water users (Elephant Butte Irrigation District and El Paso County Water Improvement District No. 1), are available via the Internet. To reach the Web page, type the following URL into a web browser:

<http://www.usbr.gov/uc/el Paso/index.html>

## **Elephant Butte and Caballo Reservoirs Resource Management Plan**

The Resource Management Plan (RMP) for Elephant Butte and Caballo Reservoirs, initiated in late 1995, was completed in 2003 and distributed to interested parties. The RMP provides a guide for Reclamation and other relevant agencies for use in the management of Elephant Butte and Caballo Reservoirs land and associated resources. Among the primary issues discussed and evaluated in the resource planning process were grazing management practices, lease lot ownership and management, threatened and endangered species, water quality, and recreation development. The sale of lease lots has been completed for a total of \$916,000 and that amount credited to the Elephant Butte Irrigation District. Further implementation of the RMP has been delayed due to a declining budget.

## **Diversion Dam Facility Review and Safety of Dams Programs**

Reclamation conducted a field examination of the Rio Grande Project reserved works structures - Percha, Leasburg, Mesilla, and Riverside Diversion Dams, on January 23-24, 2003. The final examination report will be issued in 2006. The next scheduled operation and maintenance field examination of the diversion dams is tentatively set for the fall of 2008, following the end of the irrigation season.

## **Rio Grande Project Adjudications**

The United States filed the case *United States of America v. Elephant Butte Irrigation District, et al* Civ. No. 97-0803 JP/RLP/WWD (Quiet Title to the Waters for the Rio Grande Project) on June 12, 1997, requesting the Court to quiet legal title to the waters of the Rio Grande Project in its name. The United States District Court (USDC) for the District of New Mexico dismissed the case in August 2000. On May 7, 2002, the United States Court of Appeals (10th Circuit) vacated the USDC's August 2000 decision and remanded the case back to District Court for further proceedings. Chief Judge James A. Parker issued an order to stay the case and close for administrative purposes on August 15, 2002 but further ordered that should it become necessary or desirable during the pendency of the water adjudications in New Mexico and Texas, any party may initiate proceedings as though the case had not been closed for administrative purposes.

Lower Rio Grande Basin Adjudication (New Mexico), *State of New Mexico, ex rel, Office of the State Engineer v. EBID, et al*, CV-96-888: This "stream adjudication" was originally filed by Elephant Butte Irrigation District (EBID) against the State Engineer in 1986. The most recent status conference was held on November 10, 2005.

Negotiation meetings on the Offers of Judgment on Lower Rio Grande Basin Adjudication (New Mexico) have been held between the Office of the State Engineer and the United States.

The Texas Commission on Environmental Quality (TCEQ) posted public notice of adjudication of all claims of water rights in the Upper Rio Grande (above Ft. Quitman) segment of the Rio Grande Basin and the requirement to file sworn claims pursuant to section 11.307 of the Texas

Water Code on or before April 22, 1996. The Investigation Report was completed under Phase 1. Phase 2 calls for evidentiary hearings in which claimants present evidence to support the validity of their claims. Threshold issues were briefed, and on July 31, 2003, the Administrative Law Judge ruled as follows: (1) the TCEQ has jurisdiction over the proceeding, (2) the river segment subject to the adjudication does not need to be revised or expanded, and (3) the proceeding qualifies as an adjudication of water rights under the McCarran Amendment. An evidentiary hearing was held on December 11, 2003, and Reclamation presented expert testimony about the Rio Grande Project.

On August 17, 2005, TCEQ issued an Order adopting a Preliminary Determination in the Adjudication of All Claims of Water Rights in the Upper Rio Grande (Above Fort Quitman, Texas) Segment of the Rio Grande Basin. No contests to the determination were filed.

### **Elephant Butte and Caballo Reservoir Vegetation Management Cooperative Agreement**

Under a Cooperative Agreement with the State of New Mexico, Reclamation has continued maintenance on lands within the Caballo Reservoir and Elephant Butte Reservoir projects. During 2005, 5,636 acres of woody phreatophytes were controlled at Caballo Reservoir including herbicide treatments to 750 acres. In addition, Reclamation has obtained funding under the DOI Science and Technology Invasive Species Initiative to continue cooperative studies of saltcedar control methods, pesticide monitoring, and Evapotranspiration (ET) measurements.

# **EL PASO FIELD DIVISION PLANNING STUDIES AND INTERACTION WITH THE NEW MEXICO - TEXAS WATER COMMISSION**

The New Mexico-Texas Water Commission (Commission) was created as a result of the voluntary court settlement in the El Paso vs. Reynolds (563 F. Supp. 379 D.N.M. 1983) ground water appropriation case. The Commission seeks to implement the best management practices for the water resources of the west Texas and southern New Mexico area (Figure 10). The following sections summarize studies that are being performed through the cooperation of Reclamation and the Commission.

## **Elephant Butte and Caballo Reservoir Water Quality Assessments**

Reclamation and the USGS are partners in the reservoir water quality assessments of Elephant Butte and Caballo Reservoirs. These assessments consist of monitoring temperature, dissolved oxygen, and pH profiles throughout the year, in addition to investigations into the generation and potential mitigation of hydrogen sulfide gas (H<sub>2</sub>S) releases at the Elephant Butte power production facility. The release of H<sub>2</sub>S poses a potential health risk to the employees in the power plant and falls under the purview of Occupational Safety and Health Act (OSHA) regulations. Dissolved H<sub>2</sub>S below Elephant Butte is also detrimental to the cold water trout population present in the tailwaters. This effort is being managed by Reclamation's Upper Colorado Regional Office. The actual measurements are being conducted by personnel from New Mexico State University.

## **Rio Grande/Rio Bravo International Basin Assessment / Border Regional Environmental Workgroup**

In July 2000, the Department of the Interior and Mexico's Secretariat of Environment and Natural Resources (SeMARNAT) agreed to conduct a binational water and natural resources assessment of a portion of the International reach of the Rio Grande / Rio Bravo. A Memorandum of Understanding was signed whereby an information exchange program was initiated. Data on cultural and natural resources was inventoried and exchanged with SeMARNAT under the leadership of the International Boundary & Water Commission. The focus is on data and reports for the Lower Rio Grande/Rio Bravo Basin.

Various groups have designated the subsections of the river differently. For the purposes of this assessment, the Lower Rio Grande / Rio Bravo is the Reach between El Paso, Texas and Amistad Reservoir. Major U.S. cities located along the Lower Rio Grande include El Paso, Laredo, Brownsville, and McAllen, Texas. Major Mexican cities along the Rio Grande are Juarez, Chihuahua, and Nuevo Laredo and Matamoros, Tamaulipas.

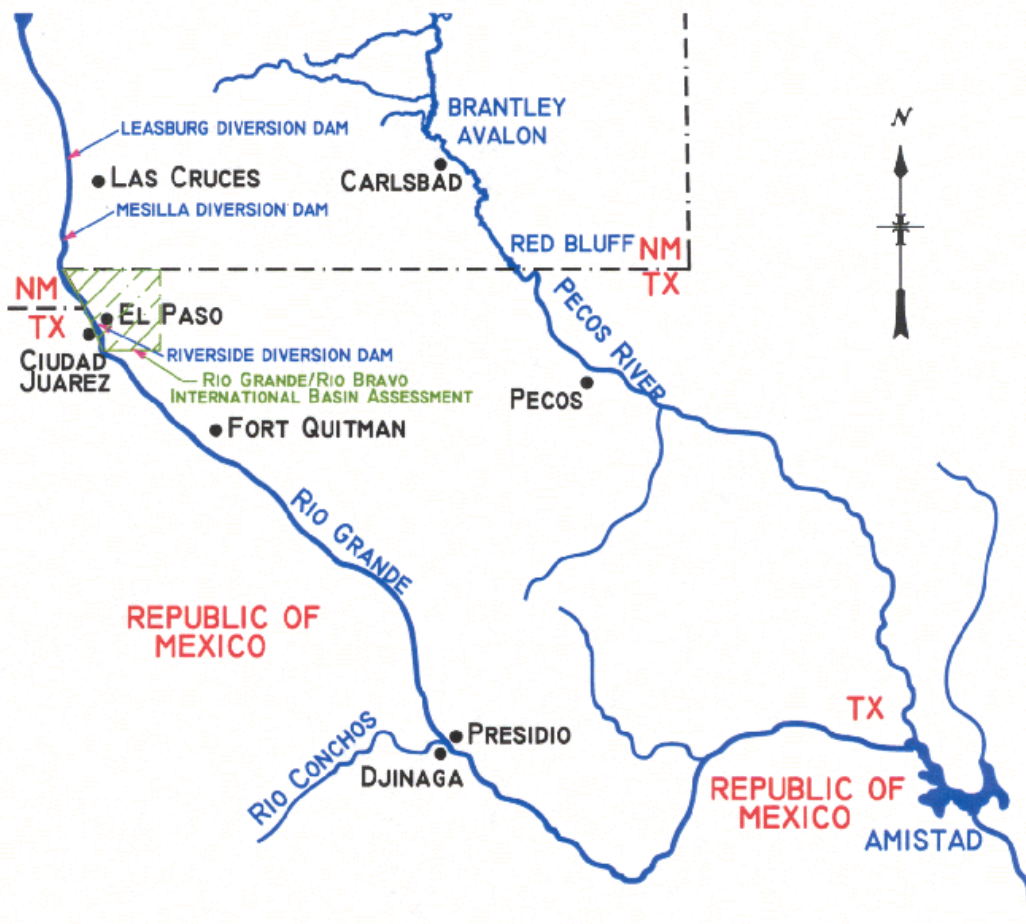


Figure 10: Area Map of the Rio Grande/Rio Bravo International Basin Assessment

The Joint Resolution signed at the Binational Rio Grande / Rio Bravo Symposium on June 14, 2000 listed eight objectives to be accomplished to protect the ecological integrity of the Rio Grande / Rio Bravo in the reach between Fort Quitman and Amistad Dam. Subsequently, meetings have been held between federal and state agency representatives (the organizing committee) to develop a strategy to move forward with initiatives to satisfy the intent of the Joint Declaration. Under a phased completion, phase 1 enabled implementation of four of the eight objectives listed in the Joint Declaration, (1: Form a binational task force; 6: Undertake research on biological and hydrologic conditions of the region; 7: Develop and exchange compatible information systems; 8: Facilitate public participation in developing strategies for environmental sustainability).

## **Current Activities**

Under the leadership of the International Boundary & Water Commission, partnerships for funding are being formulated to focus on a common border riparian problem of saltcedar control. A partnership with the International Boundary & Water Commission, Bureau of Reclamation, National Park Service, U.S. Department of Agriculture – Agricultural Research Service, and the Texas Department of Agriculture exists to identify two pilot project sites for biological control of saltcedar. Two project sites are being investigated, one at Big Bend National Park / Santa Elena Canyon with the joint cooperation of the National Park Service and SEMARNAT. The other pilot site under consideration would be in the “forgotten reach” between Ft. Quitman and Presidio, Texas.

## **Environmental Health in the US-Mexico Border Region**

Rapid population growth, economic development, and land-use changes are pushing the limits of environmental sustainability and quality in the US-Mexico border region. To allow for continued economic growth while protecting the area’s natural resources and fostering a high quality of life, the United States and Mexico need an improved understanding of the threats posed by these anthropogenic changes. The USGS has initiated a project to provide an earth and biological resources database within a geographic framework using an Internet map service (IMS) to further our understanding of the condition of the physical environment in the border region. Although the project is planned to ultimately encompass the entire US-Mexico border, initial efforts have focused on the lower Rio Grande basin from Falcon Reservoir to the Gulf of Mexico. An IMS for that study area is now available via the Internet at <http://borderhealth.cr.usgs.gov/>. Stakeholder meetings were held in the study area to gain support for the project; a Fact Sheet describing the project has been developed and meetings with partners to demonstrate the utility of the IMS have been held. New efforts will include additional data incorporation, development of real-world applications with local partners, and selection of subsequent study areas.

## **International Boundary & Water Commission planning for Rio Grande Summit per Minute 308**

An International Boundary and Water Commission (IBWC) sponsored Binational Rio Grande Basin Summit was held November 17-18, in McAllen, Texas, and Reynosa in the State of Tamaulipas, Mexico.

Over 200 attendees from Federal, state, local agencies along with non-government organizations representing entities from throughout the Rio Grande basin attended the summit. The objective of the summit was to convene experts and water users from the basin to develop recommendations for consideration by the governments of the United States and Mexico, related to the sustainable management of the basin’s water resources. The recommendations are focused on four conference themes; Legal & Institutional Aspects, Binational basin Management, Environment and Water Quality, and Finance. The recommendations included initiatives to promote Binational Data Sharing, supporting / funding of water infrastructure projects, and developing incentives for increased water conservation.

## **Reports**

A population study and observation of peregrine falcon nests in Big Bend National Park indicated that nest productivity rates were alarmingly low. This project evaluates the impacts of environmental contaminants on the Big Bend peregrine falcon during the 1997-breeding season by analyzing contaminants in potential avian and bat prey items. Preliminary research indicates that mercury; selenium and DDE may be contributing to low reproductive rates. The published report is available through the USGS.

*Survey of In-Stream and Riparian Zone Natural Resources and Ambient Water-Quality Conditions of the Rio Grande/Rio Bravo from Big Bend Ranch State Park near Redford, Texas, to the End of the Wild and Scenic River Segment at Foster's Ranch, Texas.*

## **Databases**

The report and database entitled *Standardized Watersheds Database for the Lower Rio Grande/Rio Bravo, Texas USGS Open-File Report 00-065* describes the creation of a large-scale watershed database for the lower Rio Grande/Rio Bravo Basin in Texas. The watershed database includes watersheds delineated to all 1:24,000-scale mapped stream confluences and other hydrologically significant points, selected watershed characteristics, and hydrologic derivative data sets.

In May of 2002, Reclamation and USGS collaborated in providing a literature search and building a database of water quantity and quality, habitat, flora & fauna studies for the reach between Fort Quitman and Amistad Dam.

USGS and Mexico's National Ecological Institute (INE) conducted studies of contaminants in Biota, and Invertebrates in the Big Bend / Maderas del Carmen region.

Reclamation - El Paso Field Division, compiled base line hydrologic information for the Ft. Quitman to Presidio reach, including Rio Conchos tributary flows.

DOI agencies provided and distributed Digital Orthophoto Quads for this reach of the Rio Grande / Rio Bravo.

## **Caballo Mercury Study**

Reclamation, in conjunction with the New Mexico State University's Department of Fishery and Wildlife Sciences and the USGS Biological Resources Division, has established the only mercury deposition network site in the southwestern United States. Unique to this site is the measurement of both dry and wet deposition of atmospheric mercury.

Mercury is deposited on both a regional and global scale, and the inorganic mercury which lands in the watershed of the Rio Grande eventually washes into the river and reservoir areas. Under anaerobic conditions, bacteria may transform inorganic mercury into the toxic organic form, methylmercury (MMHg). Methylmercury has profound ecological effects because it is one of the few metals that is known to bioconcentrate, bioaccumulate, and biomagnify in aquatic food chains. The biomagnification is predominantly responsible for the elevated levels of mercury present in the fish populations at Elephant Butte and Caballo Reservoirs. The primary route of MMHg accumulation in wildlife and humans is through the ingestion of fish. Currently, the State of New Mexico has issued an advisory concerning the consumption of fish from these reservoirs. The long-term prognosis of mercury accumulation in our reservoirs is unknown, and is the primary reason for undertaking this project.

The goals of this study are to identify the transport, fate, and effects of mercury in an arid environment. Ultimately, the results of this investigation may lead to a better understanding of the potential for mercury contamination in lakes and reservoirs in both arid and wetter climates across the globe. The direct results of this research may expand this investigation to cover other Reclamation reservoirs throughout the Southwest, including Lake Powell, Lake Mead, Lake Havasu, and Roosevelt Lake.

## **Snow-Melt Runoff Modeling**

Monitoring snow-melt runoff within the Rio Grande Basin is critical to the management and operation of the Rio Grande Project. The Rio Grande Project system (dams and reservoirs) is designed for flood control and for the storage and delivery of irrigation and municipal waters. The crucial factors for determining Rio Grande Project storages, diversions, and releases are the flows within the river, and expected flows from runoff predictions. Currently, this runoff assessment is made from specific NRCS Snowpack Telemetry (SNOTEL) sites coupled with information from the National Weather Service. A Snow-Melt Runoff (SMR) model, utilizing satellite imagery and data from SNOTEL points, could greatly enhance predictive capabilities for runoff forecasts. Implementation of this SMR model is an important step towards more effectively predicting the amount of runoff expected to drain into the Rio Grande Basin. Reclamation is working with the Center for Applied Remote Sensing in Agriculture, Meteorology, and Environment, a cooperative effort of the New Mexico State University, College of Agriculture and Home Economics and the U. S. Army Research Laboratory at White Sands Missile Range.





# OTHER RECLAMATION PROGRAMS

## Department of the Interior's Water 2025 Initiative

The Department of the Interior's Water 2025 Initiative is a plan for working with communities, irrigation districts, and states to help resolve and avert water supply crises in the West. The Rio Grande has been identified as among the most likely areas in the West to experience the kinds of water related conflicts that Water 2025 is addressing. Water 2025 goals are being accomplished primarily through competitive award of challenge grants to irrigation districts, communities, and states. Through the Challenge Grant Program, Reclamation provides 50/50 cost share funding for projects focused on water conservation, efficiency, and water marketing. The focus is on projects that can be completed within 24 months. The following projects are currently being funded under the Water 2025 program.

Reclamation has awarded a total of \$2,500,000 to the Middle Rio Grande Conservancy District in Fiscal Years 2004 and 2005 for system automation, water measurement, and canal lining. Reclamation will award additional Water 2025 funds to MRGCD in 2006. In support of Water 2025 objectives, Reclamation's Native American Program also provided \$400,000 to the Pueblo de Cochiti for upgrades to MRGCD facilities on pueblo lands. Reclamation is providing some technical assistance to MRGCD and has detailed an employee to the district to assist with managing the project.

Elephant Butte Irrigation District will install 100 flow control meters to implement its metering and monitoring plan to meter all farm deliveries using telemetry. The project is estimated to save 8,000 acre-feet of water per year, with 75,000 acre-feet better managed. The total project cost is \$615,000, including a Water 2025 contribution of \$300,000.

The City of Las Cruces will install pumps on the Elephant Butte Irrigation District water distribution system so that the city's Burn Lake can be used as a regulating reservoir for storm water runoff, operational spills, and irrigation water. The city also will install pumps so that EBID water stored in Burn Lake can be returned to the district as needed. The project is expected to save 3,750 acre-feet of water a year. The total project cost is \$174,889, including a Water 2025 contribution of \$86,350.

The City of El Paso Utilities Water Service Board will install four flow gaging stations and 15 electrical conductivity measurement stations on the Rio Grande and various drains. These stations will all be equipped with telemetry and provide internet-based access to real-time and archived data on flows and water quality. The project is estimated to save 7,600 acre-feet of water per year and better manage 931,840 acre-feet of water. The total project will cost \$357,386, including a Water 2025 contribution of \$165,000.

## **Reclamation's Water Conservation Field Service Program**

Through the Water Conservation Field Services Program, Reclamation provides cost share funding and technical assistance to a number of water management entities in New Mexico and Texas. The Water Conservation Field Services Program seeks to promote water use efficiency through support of outreach efforts, research projects, and providing technical assistance to water users.

Reclamation continued to support conservation outreach aimed at increasing public and industrial awareness of water issues during 2005. Institutional and industrial water management workshops were cosponsored by Reclamation, the Office of the New Mexico State Engineer, and the New Mexico Water Conservation Alliance. Funding was provided to the New Mexico Association of Conservation Districts to support the Rolling Rivers Educational Trailers throughout New Mexico. Demonstrations are generally held at the State and County Fairs, public and private schools, teacher workshops, water conferences, and other educational activities. Funding has also been provided for a water and wastewater management workshop in El Paso and childrens' water festivals in Albuquerque and Santa Fe.

An agreement with El Paso County Water Improvement District No. 1 is in place to expand irrigation system water measurement and telemetry to provide data for increased operation efficiencies. Reclamation is continuing to work with staff of the Elephant Butte Irrigation District and New Mexico State University to develop and implement well and ground water monitoring systems for the Mesilla Bolson.

New Mexico State University and the Texas Water Resource Institute are being funded to perform canal seepage and aquifer interaction studies.

Funding and technical assistance is being provided to the New Mexico communities of Hatch, Anthony, and Bernalillo for development of water conservation plans.

## **Title XVI Water Reclamation and Reuse Projects**

Under the authority of Public Laws 102-575 and 104-266, Reclamation is participating in water reclamation and reuse projects with the cities of Santa Fe, Española, and Albuquerque in New Mexico, and El Paso, Texas.

The City of Santa Fe received additional Title XVI funding in 2005 to complete work on a long range water supply plan that includes wastewater reclamation and reuse components. The contract with Santa Fe to expend the additional funding to complete work on their long range water supply planning study came at the end of the fiscal year, so there is no progress to report. Santa Fe does not intend to pursue a Title XVI project in the near term, but is moving forward on their Buckman Direct Diversion project to address their current short term water supply shortages.

The City of Española completed an appraisal study in 2000. In late 2001, Española initiated work

on a feasibility study under Public Law 102-575, Section 1604. The feasibility study covered NEPA requirements and was originally going to investigate a subsurface horizontal radial collector well diversion and treatment of Española's SJ-C water rights. The project has since shifted to a surface water diversion and treatment study, with only the filtration facility coming under Title XVI. The proposed project would mix treated surface water with existing Española well water to dilute the City's wells with naturally high fluoride levels and comply with drinking water standards. Work is now proceeding independently on the construction of the necessary diversion with the Albuquerque Corps of Engineers and Reclamation's Albuquerque Area Office. Española has extended its agreement with Reclamation that was due to expire December 31, 2005, to allow for additional arsenic removal study with remaining funds. The filtration facility Feasibility Study report was completed in 2005. The diversion project needed to supply the filtration facility remains in progress due to continuing NEPA investigation, access negotiations and point of diversion design work.

In 1999 Reclamation entered into agreements with the City of Albuquerque that provide the framework for participation and cost sharing in their 45 million dollar arsenic demonstration project and non-potable water reclamation and reuse program. Reclamation cost sharing was approved for construction of the industrial recycling and non-potable water reuse portion of the project. In 2006, the City of Albuquerque will be modifying the scope of the project to add additional arsenic treatment capability and recover construction costs associated with increases in the cost of materials such as steel, bringing the total estimated project cost to \$81 million dollars with an estimated 17,550 acre-feet of reclaimed water put to beneficial use. In 2001, an Environmental Assessment was completed for two of the reclamation and reuse projects. The non-potable water projects are developing surface water diversion and non-potable water distribution systems for the irrigation of turf grass in public areas. The industrial recycling project was completed in 2001. Construction of the subsurface collectors to divert a small portion of the City of Albuquerque's SJ-C project water began in January of 2003 and was completed in 2004. The north Albuquerque area water reclamation project is using impaired Rio Grande surface water diverted using infiltration galleries together with treated industrial effluent. In July 2003, the north I-25 non-potable water project began partial distribution of non-potable water for turf irrigation at a rate of 450 gpm. Additional capacity for the north side project will be realized following completion of the surface water diversion, conveyance pipelines, and pump stations and reservoirs. With the completion of customer hook-ups, the full north side project was brought on line in 2005 with an estimated 1930 acre-feet put to beneficial use during the calendar year. Additional customers are expected to be added to the north side project in 2006, with an estimated 2300 acre-feet of reclaimed water put to beneficial use. The south side water reclamation project is using secondary treated sewage effluent and adding a filtration process to treat the water so that it is suitable for non-potable turf irrigation. Final design for the south side project is complete, construction is expected to begin in 2006. The City of Albuquerque is currently proposing to expand the project by enhancing the arsenic technology demonstration program. The design for the College Wellhead portion of the arsenic demonstration program is complete and was advertised for bid in January 2006. Construction is expected to start in April 2006. The proposed expansion of the arsenic demonstration project includes construction of an arsenic treatment facility. This new portion of the arsenic demonstration project is estimated at an additional \$20 million dollars and is currently in the conceptual design stage.

The City of El Paso has been using recycled water since 1963. Reclamation through Title XVI has contributed to El Paso's efforts since 1996. Today El Paso recycles 700 million gallons of water per year through 40 miles of purple pipe. This recycle program has cost the City \$36 million dollars with Reclamation's contribution of \$8 million. Future plans are to extend the recycled water program to Fort Bliss which would add an additional 10 million gallons of water per day and additional 5 miles of pipe. Reclamation's contribution to the project is estimated to be 4 million dollars next year. Even though this is a success story, the story does not end there. The recycled water has been applied to some sites not suited for the water causing damage to vegetation. The City of El Paso, in conjunction with Texas A&M, is being proactive by setting up a best management program to help water users to better prepare their sites and select vegetation better suited for recycled water. Reclamation has contributed more than \$50,000 to aid El Paso's best management practices program.

Reclamation is also working with the El Paso Water Utilities-Public Service Board to conduct a pilot plant study for utilizing the Montoya Drain flows during the non-irrigation season (Oct – Mar). Plans are to use reverse osmosis and nano-filtration technology to reduce total dissolved solids levels (up to 2000 ppm) from the Montoya Drain to augment potable supplies. Consequently, the removal of sodium from the brine generated may render what has normally been an R. O. waste product into a viable soil amendment, rich in calcium and magnesium. This would eliminate the disposal costs associated with brine production as the “useful” salts would be discharged directly into the existing irrigation works of the Rio Grande Project. If this pilot study proves positive, a full sized production plant may be installed at the existing Canal Street surface Water Treatment Plant.

## Upper Rio Grande Water Operations Model

The Upper Rio Grande Water Operations Model (URGWOM) is a set of daily time-step, river-reservoir models for the Upper Rio Grande basin utilizing a numerical computer modeling software (RiverWare<sup>®</sup>). It is capable of simulating the river and reservoir hydrology, water accounting and operation logic in the Rio Grande from the Colorado-New Mexico state line to Elephant Butte Reservoir in New Mexico, and flood control from Elephant Butte Dam to American Dam. The models are used in flood control operations, water accounting, and in the evaluation of short and long-term water-operation alternatives.

The URGWOM water operations module was used to develop the Middle Rio Grande Annual Operating Plan co-released by Reclamation, the Corps, and MRGCD in April of 2005. The water operations module was also used for analyzing various water operations scenarios associated with Rio Grande Compact issues and in-stream target flows mandated by the 2003 BiOp.

The URGWOM accounting module has now completed its fifth year as the primary tool used by Reclamation for SJ-C and Rio Grande Compact accounting. The Nambé Falls Accounting Model continued to be operated as a separate model independent of the main URGWOM Accounting Model during 2005.

URGWOM development during 2005 primarily concentrated on improving model performance

related to achieving in-stream target flows, developing new methods for modeling the groundwater and surface water interactions within the middle valley, and continued documentation and clean up of the water operations ruleset. Reclamation hosted a training session to kick-off public Phase II testing of URGWOM in early August. Results of this testing are currently being compiled and analyzed by the URGWOM Technical Team.

Planned work for 2006 will concentrate on improving the simulation of the middle valley to better model the interactions with shallow groundwater and the relationship between MRGCD diversions and surface water returns. Work is also continuing toward improving URGWOM's ability to meet in-stream flow targets. The URGWOM Technical Team has also submitted a proposal to the Middle Rio Grande Endangered Species Act Collaborative Program to use URGWOM to evaluate technical alternatives in river and reservoir operations that could potentially be implemented to enhance water management within the middle Rio Grande basin.

Additional information about URGWOM and RiverWare<sup>®</sup> modeling software can be found at the Corps' web site:

<http://www.spa.usace.army.mil/urgwom/>

## **Hydrologic DataBase (HDB)**

The Hydrologic Database (HDB) is a generalized relational database management system for storing and using hydrologic data used by Reclamation in management of river and reservoir systems. It is built on Oracle<sup>®</sup> and includes connections to data sources such as Reclamation's Hydromet, and models such as RiverWare<sup>®</sup>. HDB is developed and maintained at the University of Colorado Center for Advanced Decision Support for Water and Environmental Systems (CU-CADSWES), and also by independent Reclamation consultants. HDB is currently used by Reclamation's Upper and Lower Colorado Regional Offices for joint management of the Colorado River. Several other Reclamation offices, including the Albuquerque Area Office, host HDB installations for the purposes of evaluation and applications development.

Development of water accounting and reporting functionalities for the Albuquerque Area Office's test HDB installation continued during 2005. Water accounting data is now ported from URGWOM to HDB. The intricacies of SJ-C water accounting such as contractor leases, transfers, loans, and deliveries are documented by annotating these transactions within the database. The hand written "Green Book" and HDB water accounting annotations will be maintained in parallel while development and evaluation of the HDB water accounting functionalities continue. Other HDB developments completed during 2005 include completion of seventeen draft reports to duplicate reports contained within the Annual Water Accounting Report. To date, nineteen of the forty seven tables currently generated using the Lotus<sup>®</sup> spreadsheet have been duplicated using HDB and Crystal Reports<sup>®</sup>.

Planned work for 2006 consists of continued development of reports to duplicate and ultimately replace all tables within the Annual Water Accounting Report that are currently generated using a Lotus<sup>®</sup> spreadsheet. Reclamation's contractors are providing detailed documentation of all

calculations as well as the mapping of URGWOM and Nambé Falls Accounting Model data slots to the annual report tables. During 2006, all water accounting will continue to be maintained using the current Lotus<sup>®</sup> spreadsheet in parallel to generation of water accounting reports using HDB.

Additional general information about Reclamation's HDB development efforts can be found at this CU-CADSWES HDB web site:

<http://cadswes.colorado.edu/hydrodb.com/>

## **Evapotranspiration (ET) Toolbox Decision Support System**

Reclamation and others have determined a need for rapid improvement in measuring and predicting both daily open water evaporation and daily riparian and crop water use in the Rio Grande Basin. Reclamation has developed an ET Toolbox for estimating these daily water use requirements at a resolution useful for implementation in URGWOM.

The goal of the ET Toolbox project is to supply water managers within and outside of Reclamation with accurate, real-time ET data via a dedicated website, while making the real-time ET dataset (daily riparian and crop water use estimates, open water evaporation estimates, and rainfall estimates) available to URGWOM for daily water operations model runs. The ET Toolbox is an extension of Reclamation's Agricultural Water Resources Decision Support (AWARDS) system that provides Internet access to high-resolution rainfall and daily crop water use estimates for improving the efficiency of water management and irrigation scheduling. The initial development work focused on the middle Rio Grande area from Cochiti Dam to San Marcial, which is just south of the Bosque del Apache National Wildlife Refuge in New Mexico. ET Toolbox coverage has now been extended to Elephant Butte Reservoir. ET currently accounts for an estimated 67 percent of the water depletions over this reach of the Rio Grande, including riparian vegetation, irrigated crops, and open water/wet sand evaporation.

The primary purpose of the ET Toolbox is to accurately determine, and predict, daily rainfall and water depletions along the Rio Grande. These daily ET estimates and summary year-to-date cumulative ET estimates are already available to users and water managers via the Internet at:

<http://www.usbr.gov/pmts/rivers/awards/Nm/riogrande.html>

The daily cumulative river reach ET estimates are incorporated into the URGWOM RiverWare models. RiverWare currently contains water accounting and ownership tools (objects) and peripheral water budget and flood routing tools (methods) that are configured for URGWOM. The ET Toolbox data, now available for direct import into URGWOM, allows the model to more accurately reflect the physical conditions in the basin, and will allow daily water operation managers to make better water release decisions from upstream control structures when the daily water operations URGWOM model goes online.

Lack of funding for ET research and development resulted in only maintenance level activities

for 2005. Improvements in and extensions of National Weather Service prediction products, as well as open channel / wet sand ET research and model development, are still needed for quantitative accuracy in the Toolbox.

## **Upper Rio Grande Basin Water Operations Review**

Reclamation, the Corps, and the New Mexico Interstate Stream Commission entered in to a Memorandum of Agreement in January of 2000, to cooperate as joint lead agencies in a review of their water operations activities in the Rio Grande basin above Fort Quitman, TX. The scope of the Upper Rio Grande Basin Water Operations Review and Environmental Impact Statement (Review and EIS) is limited to existing facilities and authorities. Because of ongoing litigation, water supply operations at El Vado, Elephant Butte and Caballo Reservoirs are not included in the Review and EIS. However, flood control operations and their impacts down to Fort Quitman will be considered.

The purpose of the Review and EIS is to develop a better understanding of how Corps and Reclamation facilities could be operated more efficiently and effectively as an integrated system and to formulate a plan for conducting future water operations. The review will support continued compliance with state, federal, and other applicable laws and regulations, including the Endangered Species Act. The Review may also result in improved processes for making decisions about water operations through better interagency communications and public input.

The review is taking place through the preparation of a programmatic EIS that describes and evaluates a range of alternative water operations plans. The process was officially started in March of 2000 with the notice of intent to prepare an EIS. Each of the lead agencies will publish a separate Record of Decision on its future water operations following the completion of a Final EIS.

Extensive involvement of stakeholders and interested parties, including the Rio Grande Compact Commission, International Boundary Water Commission, Indian tribes, Congressional staff, and the general public, has been part of the Review and EIS, with five official cooperating agencies that include two state government agencies, two federal agencies and one Indian tribe. The URGWOM Planning Model was used together with modeling of overbank flooding (FLO-2D), an aquatic habitat model, and a groundwater – surface water hydrologic model (MODBRANCH), to evaluate alternative water operations and the interrelated effects of the various facilities. A range of hydrologic conditions from surplus to drought was considered using a synthetic combination of actual measured flows from 1975 to 2000 to create a 40-year planning hydrograph. The hydrologic variability of this 40-year sequence mimics the last 300 years of climatic variability documented in tree ring data.

Public scoping meetings began in June of 2000 and continued through October. Scoping meetings took place in nine locations from Alamosa, CO to El Paso, TX. Comments were received from various individuals and entities, and a scoping summary was prepared. One comment that was made frequently during the scoping process was that the public desired more input into the generation of alternatives. Therefore, another round of public meetings was held



from January to May, 2002, in 10 locations in the project area. Modifications to the alternatives, as well as additions to the explanations of existing authorities, were made as a result of these meetings. In addition, outreach continues regarding the 23 Indian tribes, pueblos and nations whose lands are affected by alternative development.

Combined alternatives identified for this review include the following highlights:

- No changes to facilities in Colorado
- Administrative changes to two Reclamation facilities – Heron Reservoir’s waiver policy, and the Low Flow Conveyance Channel’s diversion policy
- Storage options at Abiquiu reservoir operated by the Corps
- Changes to channel capacity below the Corps’ reservoirs of Abiquiu and Cochiti Lake
- Improvements in communications at all facilities, including flood management protocol below Elephant Butte and Caballo, two Reclamation facilities.

In 2004, a suite of tools, including the URGWOM Planning Model, were used to assist in the preliminary screening of twenty-two alternatives and detailed analysis of impacts from six alternatives over the 40-year synthetic period of record. Evaluation of alternative impacts was guided by a two-tiered decision process. The first tier of analysis included a water operations review of alternative performance against an established set of weighted decision criteria. The initial twenty-two alternatives were narrowed down to six alternatives which were subsequently studied in detail to evaluate impacts and compare performance against the no action alternative. Interdisciplinary NEPA technical teams evaluated impacts using resource-specific performance criteria. Alternative performance was further evaluated using decision criteria, weighted in importance by the joint lead agencies and steering committee, leading to the selection of the alternative that best meets often-competing objectives. GIS and database tools were used to assess data quality and uncertainty, further assisting the decision-making process. Finally, a model developed by Sandia National Laboratories will be refined to provide stakeholders access to a quick simulation tool that helps stakeholders understand the tradeoffs made between different types of alternatives and their resulting resource impacts using documented data and evaluation information from the URGWOM Planning Model and the Review and EIS.

The Draft EIS and technical resource reports were prepared in 2005. The joint-lead agencies participated in government-to-government consultations in 2005 and early 2006 with those Pueblos and Tribes willing to schedule such meetings. The Notice of Availability of the Draft EIS was published in the Federal Register on January 20, 2006. To present the results of the Draft EIS and to solicit public input, eight public meetings and two tribal workshops took place in February and March 2006. In addition to presentations concerning the tools used to evaluate alternatives and resource impacts for the Draft EIS, the decision analysis model developed by Sandia National Laboratories was used in these meetings and workshops to facilitate public understanding of the tradeoffs and resource impacts associated with the alternatives considered. The 60-day public comment period culminates on March 21, 2006. Following receipt of public comments, the EIS will be revised and the Final EIS will be prepared. The Final EIS is expected to be released later in 2006.

## **Native American Affairs Programs**

Reclamation has numerous projects underway with pueblos and tribes. These projects fall under several categories, including the Native American Affairs Program, the Drought Relief Program, the Planning Program, and special projects funded through Congressional write-ins.

As part of Reclamation's Native American and other programs, assistance was given to various Pueblos to help with improving irrigation system efficiency. Some of the items funded or purchased included concrete lining of farm ditches, laser leveling, check structures, pipes, and gates. Some of the assistance will be used as a cost share with the Middle Rio Grande Conservancy District's Water 2025 funding to improve District facilities through Pueblo land.

Windmills were repaired at some Pueblos through the Native American Program. Wells for irrigation and drought mitigation were repaired at some Pueblos.

Work proceeded on technical studies in support of a negotiated settlement of the Abouselman adjudication on the Rio Jemez involving Jemez, Zia, and Santa Ana Pueblos.

## **Emergency Drought Program**

In 2004, the City of Santa Fe received a grant under the Reclamation States Emergency Drought Relief Act of 1991 (43 U.S.C. 2201 et. sec.) for the construction of several deep wells. The project was managed out of the Bureau of Reclamation's Durango, Colorado, office. The well construction is complete and the project has been closed out.

In 2005, two more New Mexico locations received drought funds. The City of Española, and the Town of Chimayo through the Greater Chimayo Mutual Domestic Water Consumers Association, received \$221,594 and \$177,275, respectively. Contracts were issued at the end of the fiscal year. There was no progress to report for 2005.





